JOURNAL

OF

THE FRANKLIN INSTITUTE

OF THE STATE OF PENNSYLVANIA,

FOR THE

PROMOTION OF THE MECHANIC ARTS.

DECEMBER, 1847.

FRANKLIN INSTITUTE.

Seventeenth Exhibition of American Manufactures, held in the city of Philadelphia, from the 19th to the 30th of October, inclusive, 1847, by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts.

ADDRESS BY OWEN EVANS, Esq.,

Chairman of the Committee on Exhibitions. Delivered on announcing the Premiums awarded.

LADIES AND GENTLEMEN:—Our present exhibition presents highly gratifying evidence of the growth of American manufactures, and gives a prescience of the perfection they are destined to attain. Every year there is a curtailment of our dependence upon the workshops of other countries, and every year do we thus assert our increased importance as a nation. Idleness forms no part of our character. By dint of skill, perseverance, and industry, we successfully compete with densely populated districts of other countries, and effect revolutions in trade as remarkable and startling as any that occur in governments. There is, in the American people, an innate energy, seeming to have a latent existence, that is equivalent to whatever task is imposed—material for any and every emergency. We have but to proclaim a want, and it is met, let the obstacles be what they may. The pen, the pencil, and the chisel have as distinguished masters among us as

in any other nation, although the pursuits are attended with much less promise of emolument in fame or fortune than where court patronage is attainable.

Our mechanic arts are not more remarkable for their rapid progress than for their variety—a variety not attempted any where else, and in many branches their excellence is unrivalled.

There is also to be distinguished, a creditable effort to harmonize fashion with comfort, convenience, and utility, but there is yet much room for improvement in this feature. In this particular we also bear honorable comparison with other nations.

To the Franklin Institute undoubtedly belongs much credit for our progress in the Mechanic Arts. All its efforts are directed to this purpose; but the encouragement of the Mechanic Arts is not the only province of its usefulness. There is no institution in the country where so much valuable information may be obtained so cheaply. A young man whose mind is open to instruction finds in the Institute facilities for acquiring knowledge in almost any useful pursuit, and, by awakening a taste for what is useful, he may be induced to a career honorable to himself and valuable to his fellow men; whereas, had not the Hall of the Institute been open to him, some of the very many attractive doors of idleness and dissipation, that are always open, would have enticed him to deeds and pastimes in which there would have been neither credit nor profit. But my capacity would serve but feebly in laying before the community the favorable considerations to which the Franklin Institute is entitled.

We are compelled to the same course this year as last in regard to the general report. The reports of the judges were, many of them, delayed to so late a period that it was impossible to get the general report ready to read at the close of the exhibition.

We take the present opportunity to tender thanks to the judges for their valuable services. The branches allotted to the ladies received the same careful attention this year as last—their reports bear abundant testimony to the industry and zeal of the compilers, and we tender our sincere thanks to them. We also thank the Committee of Arrangement, the depositors, and the visitors.

Although we rarely find, at any one exhibition, all the branches of manufactures fully and correctly represented, yet there is always sufficient to prove that they are advancing; and although we believe the manufacturers neglect their interests in failing to avail themselves of such opportunities to inform the consumers what they can accomplish, there is sufficient to manifest the advantage of holding the exhibitions. An important feature in their usefulness is the fact that they are gradually wearing away the prejudice against articles of home production. A reaction is taking place in the community in this respect—a patriotic ambition to possess the handiwork of the American mechanic.

Report of the Committee on Exhibitions.

The Committee on Exhibitions, of the Franklin Institute, respectfully present the following report concerning the Seventeenth Exhibition, which has just closed.

In the performance of this duty, they are gratified at being able to state that the general result has been, in a high degree, satisfactory and encouraging. The quantity and variety of the goods and articles deposited was very extensive; most of the departments of manufacturing industry being well represented, and nearly all showing decided evidence of the progress of improvement in material, fabric, workmanship, and finish.

They are renewedly convinced, from present as well as past experience, that these periodical exhibitions of the productions of our manufacturers, mechanics, and artizans, exercise a beneficial influence, not only upon the general progress of the arts and manufactures of our country, but upon the direct interests of those who avail themselves of these opportunities to display specimens of ingenious invention, improved construction, or of excellent or creditable workmanship. In viewing this immense collection of substantial, useful, ingenious, or elegant articles, adapted to almost every conceivable purpose of utility, convenience, or luxury—the mind of every impartial observer must have been impressed with the conviction that our country is now able to supply most, if not all, of our wants, without recourse to foreign workshops for aid.

In the arrangement of articles in the rooms, care was taken to observe as much symmetry and order as possible, so that the general grouping and effect might be harmonious and pleasing. From the satisfaction expressed by visitors in relation to this subject, it is believed that, in this difficult point, considerable success was attained, and that the general arrangement was superior in effect to that of any former exhibition. Experience and careful attention will, in future, lead to still more improvement in this respect.

The number of deposits brought in too late for entry on the judges' lists is, this year, smaller than usual; but still many excellent articles have failed to receive notice in consequence of not being entered in time.

The awards made by the Committee have been those recommended by the judges who were selected to examine the articles in each department of the exhibition. These judges were experienced persons, selected on account of their acquaintance with the respective branches on which they were appointed; and great care was taken to guard against any improper influence or interest in the decision which they might make. If injustice has been done, or if meritorious articles have been neglected, or overlooked—it should be attributed to the difficulty of minutely examining and considering every article in such an immense collection, and not to intentional neglect, or a partiality for particular depositors. The Committee have long since learned that it is impossible to please all: but feel conscious that they have endeavored, in all things, to perform their duty with strict justice and impartiality.

Annexed is a general summary, compiled from the reports of the judges in the several departments of the exhibition.

I.—*Cotton Goods.*

The judges regard this as one of the most important branches of our domestic industry, and express their regret that the display was not commensurate with its utility as a public benefit.

To each of the following named articles, regarded as the best of their kind, a First Premium is awarded:—

No. 42, tickings, by R. Garsed & Bros., Frankford. Remarkable for excellence of fabric, evenness of finish, and purity and distinctness of color.

No. 95, heavy brown sheetings, from the Conestoga steam mills, Lancaster, Pa., deposited by David S. Brown & Co. These the judges consider as the perfection of that kind of goods; possessing the elements of great durability, with an evenness and beauty of fabric and finish hitherto unapproached.

No. 78, cotton prints, by J. Briggs & Co., Frankford. In delicacy and richness of coloring, and in distinctness of figure and ground, these goods are considered as evidence of great skill in the art of printing cottons. The judges remark that the general display of prints at the present exhibition, shows very great improvement in the production of solid grounds, as well as in the clearness with which the figures are defined.

No. 64, Cashmere d' Ecosse, from the Manchester mills, N. H., deposited by Robert Ewing. A new article of American fabric, and a very good specimen with regard to both style and finish.

A Second Premium is awarded to Goodall & Co., of the Philadelphia bleach works, for bleaching yarns and Canton flannels in a very superior manner.

The judges notice with commendation No. 4, cotton curtain fringe, by Henry Hetzel, deposited by W. P. Hollingsworth, Philadelphia; No. 106, cotton pantaloon stuffs, by Joseph Ripka; and Nos. 109, 110, by Kempton & Coppuck, Manayunk.

The bleached muslins, and other goods, from the New York mills, maintain their well established character for excellence. In ginghams, furniture prints, Canton flannels, and mousselines de laine, but little improvement is noticed.

II.—*Woolen Goods.*

This department of manufactures was comparatively much better represented in the exhibition than that of cottons. It was examined by experienced judges, who recommend First Premiums to the following:—

No. 115, white ribbon-bound blankets, by W. C. Warner, of Philadelphia, deposited by David S. Brown & Co. A very beautiful and well-made article.

No. 92, black cloths, by W. & D. D. Farnum & Co., Waterford, Mass., deposited by D. S. Brown & Co. The judges consider these cloths very superior: the material being of the best quality, and the workmanship showing the superior skill of the makers.

This matter having been referred back to the judges, they declare

that their intention was to represent these cloths as the finest exhibited by the Institute within their knowledge, and that their superior make and finish fully entitle them to the highest award in the power of the Institute. The Committee therefore refer the subject relating to these cloths to the Institute for determination.

No. 127, black, blue, and green blanket coatings, by the New England Company, Saxonville, Mass., deposited by Pease & Foster. Highly creditable to the makers.

No. 35, assorted Cashmeretts, by Hill, Carpenter & Co., Providence, R. I., deposited by D. S. Brown & Co. A new article of American manufacture: the work and finish are of the highest order.

No. 91, French style fancy cassimeres, by W. & D. D. Farnum, Waterford, Mass., deposited by D. S. Brown & Co. The superior style and quality of these goods give evidence of great perfection in American manufacture.

No. 24, worsted embroidered shawls, by Duncan & Cunningham, Belleville, N. J., deposited by D. S. Brown & Co. A very superior article: the embroidery being highly creditable to the skill and enterprise of the makers.

Nos. 27, 28, embossed table covers, by Duncan & Cunningham. Tasteful in style and pattern.

Nos. 39, 40, woolen and worsted yarn, by M. & E. Hey, Springfield, Delaware county, Pa. Exceedingly well made, and giving evidence of great improvement in this branch of manufacture.

A number of fleeces of excellent wool were deposited, which were considered worthy of premiums; but the names of the growers being unknown, the premiums cannot be given.

To the following named articles a Second Premium is awarded:

No. 67, assorted cloths, by the Utica Steam Woolen Company, N. Y., deposited by Thomas & Martin. Exceedingly well made and creditable goods.

No. 102, fancy black cassimeres, by Wethered & Bro., Baltimore, deposited by Todhunter & Sill. Deserving the premium for style and finish more than for quality.

Nos. 18, 29, 30, Oxford mixed and black doeskin cassimeres, by W. & D. D. Farnum, Waterford, Mass., deposited by D. S. Brown & Co. Well made and handsomely finished.

Nos. 19, 31, 32, 34, mixed cassimeres, by Hill, Carpenter & Co., Providence, R. I., deposited by D. S. Brown & Co. Very desirable goods: worthy of encouragement.

No. 20, printed piano covers, by W. & L. W. Duncan, Belleville, N. J., deposited by D. S. Brown & Co. Considered by the judges to merit a premium for the style and printing.

The judges notice favorably in their report, the following, as very good articles: Mackinaw and twilled blankets, by the Gonic Manufacturing Company, deposited by D. S. Brown & Co. and R. C. Niles. Colored cloths, by the Hamilton Woolen Company, deposited by J. S. Dunlap. Satinetts, by Camp & Norris, Woodbury, Conn., deposited by C. H. Welling. Merino cassimeres, by Thos. Drake, Philadelphia, and white bed blankets, by the New England Company,

deposited by Pease & Foster. Imitation cassimeres, printed by C. S. Marshall, Philadelphia. Striped and plaid wool filled cassimeres, by Kempton & Coppuck.

III.—*Carpetings.*

There was but a meagre display of goods in this department, and the judges report nothing deserving of special notice except No. 320, oil cloths, table stand, piano covers, and rugs, by Jas. W. Woodruff, Elizabethtown, N. J., to whom is awarded a Third Premium for the rugs.

IV.—*Silk Goods.*

A First Premium is awarded to J. C. Dobleman, of Philadelphia, for silk fringe, of superior coloring and good workmanship, made from American silk.

A Second Premium to Godfrey Greul, Philadelphia, for No. 48, coach lace and silk fringe, of superior workmanship, made from American silk.

A Third Premium to John Crabtree, Staten Island, for printing silk handkerchiefs.

Nos. 17, 23, embroidered shawls, by Duncan & Cunningham, Belleville, N. J., are a beautiful article, and fully equal to specimens formerly exhibited, for which the makers have received premiums.

The judges notice in terms of commendation: No. 49, sewing silks, by G. W. Foss & Co., Mansfield, Conn.; and No. 70, silk bonnet wire, by Joseph Moore, Philadelphia.

V.—*Iron and Steel.*

The judges on this important branch of manufacture express their gratification at being able to state that there is an evident improvement in the making of rolled iron, of the various sizes and patterns; noticing, at the same time, that the manufacturers appear to have turned their attention almost exclusively to this branch of the business. The manufacture of hammered iron is consequently neglected; a circumstance which the judges regret, as they consider hammered iron to be nearly as important as that which is rolled. They are sorry to observe the indifference manifested by our iron manufacturers with regard to exhibiting; nearly all the iron in the present exhibition having been deposited by the firm of Morris, Jones & Co., who deserve great credit for their zeal in promoting the object of the Institute in this important department.

A First Premium is awarded to No. 1716, twenty bars of rolled iron, by Moore & Hooven, Norristown, Pa., deposited by Morris, Jones & Co. This iron is exceedingly well handled: the bars are round, well straightened, and trimmed at the ends. It is believed to be of good quality.

A Second Premium to No. 1718, six sheets of boiler iron, made by Henry Potts & Co., Pottstown, Pa., deposited by Morris, Jones & Co. These are the largest sheets of boiler iron that have been exhibited,

being 22 feet long by 30 inches broad; the largest of them weighing 585 pounds. They are well rolled, and appear to be of good quality.

The judges make favorable mention of No. 1535, ten bars of charcoal hammered iron, by Jacob B. Weidman, Lebanon county, Pa. Very neatly hammered, and of good quality. No. 1560, a lot of rolled iron of various sizes, and a bundle of wire rods, by Thomas & Ogden, Philadelphia. Very handsomely rolled, and of good quality; but not superior to that for which they received a premium at the last exhibition. No. 1722, rolled iron, by James Rowland & Co., Philadelphia. Neatly rolled, and considered to be a very creditable article. No. 1719, circular sheets of boiler iron, by Yearsley & Bro., Coatesville, Pa.; No. 1720, boiler iron, by J. & J. Forsyth & Sons, Gallagherville, Pa.; No. 1721, do., by Rowland & Hunt, Cheltenham, Pa.: all handsomely made and good articles. No. 1572, slit rods, by Valentine & Thomas, deposited by Samuel Milliken, of good quality, and equal to those formerly exhibited.

VI.—*Umbrellas.*

The quantity and variety of goods in this department of the exhibition is, this year, unusually small. The judges have not thought proper to recommend any awards, but notice No. 114, a case of umbrellas and parasols, by Wm. A. Drown, as containing many handsome specimens of skill and good taste. Also, No. 120, cane umbrellas, by W. H. Richardson; an improved article, of great convenience to travelers.

VII.—*Lamps and Gas Fixtures.*

A principal part of the display in this division of the exhibition is derived from the extensive establishment of Cornelius & Co., of Philadelphia; their assortment of ornamental lamps and gas pendants being fully equal to the productions of former years. The magnificent chandelier made by them for the Opera House at New York, surpasses all heretofore exhibited in beauty and effect. For it a First Premium is awarded.

To E. Whelan & Co., Philadelphia, for parlor chandeliers, of tasteful design, a Third Premium.

The lard lamps by J. W. Henry, of Philadelphia, and H. P. Kelsey, are equal in excellence to those of last year.

The so-called portable gas lamps, by E. J. Clause, give a pleasant and cheap light, derived from an inflammable liquid mixture; but, in the opinion of the judges, do not appear to be exempt from danger, if used carelessly.

VIII.—*Hardware and Cutlery.*

In this interesting and well sustained department, the judges express their gratification in being able to remark that the specimens exhibited evince, on the part of the manufacturers, a determination to maintain the high reputation which has been acquired in this branch of American industry. They desire that this remark should be understood as universally applicable to the articles submitted to their inspection.

To each of the following, a First Premium is awarded:—

No. 603, guns and pistols, by John Krider, Philadelphia. The workmanship of these, especially the double barreled rifle, and shot gun, is of the best kind; they are neat, well proportioned, substantial, and finished with excellent taste.

No. 637, axes, by Wm. Mann, Jr., Lewistown, Pa., deposited by Martin Buehler & Bro. The judges consider these as the best article of the kind ever examined by them. The surfaces are remarkably free from flaws; the tools are well proportioned and elegantly finished.

No. 675, gilt buttons, by Wadhams & Co., Wolcottville, Conn., deposited by D. D. Byerly. Elegantly finished in all respects, and showing a high state of perfection in this branch of manufactures.

No. 719, samples of stocks and dies, by J. M. King, Waterford, N. Y., deposited by Curtis & Hand. These articles appear to have been made with great care in all respects, in the forging, filing, tempering, and finishing.

No. 684, cast-iron butt hinges, by W. P. Cresson, Philadelphia. Remarkable for excellence of finish in all respects.

A Second Premium is adjudged to each of the following:—

No. 602, hammers and sample tools, by B. Richardson & Son, Philadelphia. Very well made, highly finished, and well adapted to the uses to which they are to be applied.

No. 646, augers, by A. Conard, Whitemarsh, Pa., deposited by Thompson, Carr & Co. Highly creditable to the taste and skill of the maker.

No. 645, saddlers' tools, by James M. Huber, Philadelphia. Well made articles.

No. 678, saddlers' tools, by J. Steiner & Co., Philadelphia. Very creditable to the makers.

No. 714, hoes, tobacco knives, &c., by Canfield & Co., Newark, N. J. Well got up, in every respect.

No. 628, brass cocks, by Odell and English, Baltimore. Well made, well finished, and beautiful specimens.

The makers of the following named articles have mostly, if not all, received first premiums at former exhibitions for the excellence of their manufactures. The present specimens fully sustain the deservedly high reputation of their respective makers:

No. 611, brass cocks, by Lambe & Co. 612, saws and tools, by W. P. Cresson. 632, planes, by E. W. Carpenter. 633, stocks and dies, by B. Martins. 649, brass ware, by Frederick Jordan. 658, edge tools, by John Beatty. 659, butt hinges, by Roy & Co. 670, files, by R. Murphy. 671, shoemakers' tools, by C. H. Blittersdorf. 673, carriage and machine bolts, by E. & P. Coleman. 698, planes, by John Colton. 717, screws, by the N. E. Screw Company. 722, wrenches, by S. Merrick, Springfield, Mass. 609, shears, by R. Heinisch.

The judges deem it but justice to notice particularly the substantial and well made stand of vises, made by Fisher & Martin, of Newport, Maine. A similar article, from the same makers, is now in the hands of the Committee on Science and the Arts, for examination.

The following are specially commended by the judges as deserving

of favorable notice: No. 601, scythes, by R. B. Dunn, dep. by J. J. Duncan & Co. 607, scythes, by J. S. Chandler & Co., dep. by E. S. Handy & Co. 620, scythes, by Roby & Sawyer, dep. by Edw. Lewis. 615, shovels and spades, by David Snyder. 626, shovels, by James Wood & Sons. 629, shovels, by John Weightman. 631, spades, by T. & B. Rowland.

Special praise is also bestowed in the judges' report upon No. 616, ship caulkers' tools, by Wm. Noble; 624, hoes, by J. Souder; 627, post hinges for gates, by Seymour & Bro.; 636, bridle bits, &c., by John Robbins; 635, gun locks, by James Golcher; 614, hatchets, by Chas. Sonntag; 642, weaver's steel reed, by J. A. Gowdey; 653, locks, by A. Prutzman; 655, locks and latches, by Livingston, Roggen & Co.; 660 & 661, hinges and shutter fastenings, by Seymour, Bro. & Co.; 674, sad irons, by Carr & Haines; 691 & 692, locks, by Joseph Nock; 701 & 716, shoe knives, by J. & L. Ames; 702, screw drivers, by Chas. Souder; 720, iron pump and waffle irons, by Auger & Lord; 721, waffle irons, by Chapman, Randall & Co.; 606, coffee mills, by J. Kirchberg; 654, do. by W. C. Lawson; 669, do. by Livingston, Roggen, & Co.; 619, gardener's tools, by H. A. Dreer. They also notice No. 647, samples of improved patent fish hooks, as a well made and very ingenious contrivance. The razor strops by C. Y. Haines, and also those by Snyder & Morris, are a fair creditable article.

Among the wire work, the following are mentioned as very creditable to the makers, and worthy of the special notice of the Institute. Nos. 1538, 1539 & 1540, woven wire, sieves, and dish covers, by Watson & Cox; 1648 & 1676, woven wire, by W. M. & J. B. Wickersham; 1653, wire cloth and sieves, by J. & D. Sellers; 1682, woven wire, twilled and plain, by James Douglass.

A number of excellent articles in the collection of hardware were brought in too late to be entered on the judges' lists; and some o those which were entered in time, they were unable to find.

IX.—*Saddlery and Harness.*

The display of saddlery and harness was not extensive, and, as a whole, in the opinion of the judges, decidedly inferior to previous exhibitions. The deservedly high reputation of our Philadelphia mechanics in this branch of business, could scarcely be ascertained by a visit to the present exhibition. There is no doubt that an excellent and highly creditable assortment might have been made, of articles taken from the cases of the manufacturers, intended for their ordinary sales. So much apparent apathy in this department is to be regretted,—and a hope is indulged that, at future exhibitions, the well known taste and skill of our mechanics may be more fully represented. Should this not be the case, an opportunity will be furnished to manufacturers from distant places to carry off the honors of the Institute.

A First Premium is awarded to Robert Carey of Philadelphia, for a Shaftoe saddle, No. 439, of good style and excellent workmanship.

Second Premiums to the following:

No. 314, a russet traveling trunk, by Thomas W. Mattson, Philadelphia, considered by the judges as an excellent article.

No. 406, a trunk of patent leather, by John Unruh, Philadelphia.

No. 407, a valise trunk, by W. P. Taylor; tastefully and substantially made.

No. 396, a russet traveling trunk, with drawers, by Jacob Moyer, Philadelphia, of good workmanship.

A Third Premium is adjudged to No. 404, a mail coach trunk, by E. P. Moyer, a convenient, light and substantial article. Also to No. 398, cowhide whips, by Charles Cummings, Philadelphia, very creditable specimens of this kind of goods.

The judges mention favorably, No. 315, single harness, by W. W. Moyer. No. 335, saddle trees, by Baldwin, James & Co. No. 327, ornaments for harness, by F. C. Key, Philadelphia. No. 433, a hatbox, by Charles Coward; and No. 371, a saddle, by George Tees.

Several other trunks and valises were deposited; but being locked, the judges could not examine them fully.

X.—*Models and Machinery.*

The judges appointed to examine this department of the exhibition, report that they have devoted considerable time to the duty; but fear that it has not been completely performed, in consequence of the great extent and variety of the deposits in this branch. They suggest that their labors would be essentially diminished by meeting upon the days appropriated to receiving goods, prior to the opening of the exhibition; whereby a better opportunity would be afforded for examination, and exclusion of articles unworthy a place in the exhibition; and also for consultation with the inventors, when desired. The limits of their report not affording sufficient space for even a brief notice of all the articles entered upon their list; they have confined themselves to an enumeration of such as are deemed worthy of awards, or especial commendation.

Some of the machines which would require more extended trial and examination than the short period of the exhibition allows, are referred to the notice of the Committee of the Institute on Science and the Arts, to whom such investigations properly belong.

To this class belong the following:

No. 1542, a tubular steam boiler, by James Montgomery, of Tennessee.

No. 1564, a direct action steam hammer, by L. Kirk, Reading, Pa.

No. 1576, samples of fire brick, by Dager & Potts, Montgomery co., Pennsylvania.

No. 1586, smut machine, by J. Johnson, Wilmington, Del.

No. 1609, rotary steam engine, by James Black & Co., Phila.

No. 1659, rotary blast generator, by C. C. Lloyd, Philadelphia.

To the following named articles, First Premiums are awarded:—

No. 1554, a cutting press, by J. S. Eckfeldt, of the U. S. Mint. Of this article the judges remark that it is not inferior to the hitherto unsurpassed productions of that establishment, in tastefulness of design, fitness of proportions, and exquisite beauty of finish.

No. 1553, a card printing press, by S. P. Ruggles, of Boston deposited by James Young. Of great simplicity and rapid action.

No. 1550, a weighing cart, by J. A. Stewart, Philadelphia. This cart is provided with a compound lever balance, for weighing the load

placed in it: appearing to be a successful attempt at constructing an article which promises to be extensively useful.

No. 1697, wrought iron tubes, by Morris, Tasker, & Morris, Philadelphia. These tubes, intended for steam, gas, or water, manifest great skill in this important manufacture.

No. 1672, hydraulic rams, by Henry Birkenbine, Philadelphia. In the construction of these machines, of various sizes, for raising water, the manufacturer appears to have been highly successful.

No. 1737, power loom, by James Nield, Taunton, Mass. This loom is furnished with a rotating shuttle box, admirably adapted to weaving plaids, carpeting, &c.

No. 1727½, locomotive chimney, with spark arrester, by French, Baird, & Campbell, Philadelphia: the efficiency of which is satisfactorily attested.

The two following were adjudged worthy of a First Premium; but Mr. Whitney and Mr. Agnew being members of the Board of Managers, are precluded by our rules from receiving any award:

No. 1583, railroad wheels, by A. Whitney & Son, Philadelphia. These wheels are cast with chilled rims, and then annealed in such a manner as to prevent the unequal tension which renders such castings peculiarly liable to fracture.

No. 1615, seal press, made for the U. S. District Court, by John Agnew, Philadelphia. A very well made and excellent article; worthy of the distinguished reputation of the maker.

Second Premiums are awarded as follows:—

No. 1522, S. P. Miller of Philadelphia, for a machine for hand pressing bricks.

No. 1529, T. S. Speakman, Philadelphia, for a rock excavator, believed to be a useful machine.

No. ——, D. O. Prouty, Philadelphia, for an extensive display of useful agricultural implements.

No. 1575, R. D. Ford, Philadelphia, for a slide rest, excellently finished: deposited by Dr. Beck.

No. 1635, Adam Gawthrop, Chester co., Pa., for an hydraulic ram.

No. 1523, Benjamin Wiggins, Bucks county, Pa., for an improved plough, of excellent model and finish: the mechanical work by George Buckman.

No. 1524, Taylor & Flagler, Peekskill, N. Y., for a portable forge; very complete and compact.

No. 1525, Evans & Watson, Philadelphia, for a portable water closet; judiciously contrived.

No. 1649, John Mc. Clintock, Philadelphia, for a mortising and tenoning machine.

Nos. 1676–7, Henry Jenkins, Pottsville, Pa., for woven wire and wire railings.

No. 1728, James Smith & Co., Philadelphia, for machine cards, made in the exhibition, on their beautiful and compact card setting machine.

No. 1733, J. H. Stewart, Philadelphia, for his improved card printing press.

No. 1678, Joseph Turner, Kensington, for an improved spinning machine.

Third Premiums to the following:

No. 1547, Joseph Jones, Camden, N. J., for a boring machine for the use of wheelwrights and joiners.

No. 1569, B. R. Smith, Philadelphia, for a double action lifting pump, ingeniously contrived.

No. 1669, William Willard, Philadelphia, for leather hose, well made.

No. 1627, Thomas Jackson, Reading, Pa., for samples of flat rope.

The judges also mention the following as worthy of favorable notice and commendation:

No. 1511, Printing Press, by Adam Ramage, Philadelphia; 1702-3, copying and seal presses, by Charles Evans, Philadelphia; 1543–4–5, platform and other scales, by E. & T. Fairbanks, St. Johnsbury, Vt.; 1581, platform scales, by Ellicott & Abbott, Philadelphia; also platform scales by Root & Chase, York, Pa., by Livingston & Roggan, Pittsburg, and by Gottlieb M. Barth, Philadelphia; 1503, hay rakes, by Silas Roads, Bucks county, Pa.; 1658, mortising machine, by J. A. Fay, Keene, N. H., and 1630, do., by Thomas Rogers, Philadelphia, Pa.; 1646, smiths' bellows, by G. W. Metz, Philadelphia, and 1570, do., by M. S. Reeves, Philadelphia; 1653-4, wire work and machine Cards, by J. D. Sellers, and Sellers & Pennock, Philadelphia; 1660-1-2-3, agricultural implements, by E. Chandler, Philadelphia.

Hydraulic rams, and several pumps, by W. & B. Douglass, of Middletown, Conn., were not received in time for competition, having been unavoidably detained on the way. They all appear to be good articles. One of the rams was in operation during several days of the exhibition;—doing its work in a satisfactory manner.

XI.—*Stoves and Grates.*

The present exhibition is remarkable for the number of good cooking stoves and ranges which have been deposited. The competition in this business, within the last few years, has produced such great improvement both in the principle and form of cook stoves, that culinary operations are now rendered easy, in the use of either wood or coal.

The judges in this department report, that they consider the following named excellent stoves as fully equal in merit to those which have received first premiums at former exhibitions; but perceiving no marked superiority over some formerly exhibited, they decline making any award in favor of those deposited this year. In those mentioned below, the judges perceive so little difference in merit that they do not think themselves justified in making a preference; considering these all deserving of equal credit:

No. 1504, American hot air cook stove, by Low & Hicks, Troy, N. Y., deposited by North & Harrison, Philapelphia.

No. 1505, Fay's Eureka, cook stove, Troy, N. Y., deposited by North & Harrison, Philadelphia.

No. 1506, Washington air tight cook stove, Anthony Davy & Co., Troy, N. Y., deposited by North & Harrison, Philadelphia.

No. 1516, Pierce's American air tight cook stove, for wood or coal, by Johnson & Cox, Troy, N. Y., deposited by Cox & Boughton, Philadelphia.

Nos. 1508-9, Atwood's patent empire cook stove, by Atwood, Troy, N. Y., deposited by E. Fizell, Philadelphia.

No. 1641, Stewart's air tight summer and winter cook stove, by B. P. Stewart, Troy, N. Y., deposited by North & Harrison.

The following named are mentioned by the judges as being fully equal to those presented at former exhibitions by the same makers, who then received premiums :

No. 1629, Granger's brick oven cook stove, by W. P. Cresson, Philadelphia.

No. 1626, parlor cook stove, by W. P. Cresson, Philadelphia.

No. 1633, air tight cook stove, by Wager & Dater, Troy, N. Y., deposited by P. W. Baker, Philadelphia.

No. 1647, cook stove, by P. F. Hagar, Philadelphia.

The following are considered by the judges as excellent stoves, and worthy of creditable notice:

No. 1519, Thatcher's Union air tight cook stove, by John W. Henry, Philadelphia.

No. 1517, hot air cook stove, by F. W. Most, Philadelphia.

Also cook stoves by Mathieu & Doiseau, and by John B. Kohler, Philadelphia.

Of the cooking ranges, they report as follows :

No. 1624, portable cooking range, by Julius Fink, Philadelphia. This range maintains the credit of the maker, who received for it a first premium on a former occasion.

No. 1704, cooking range, by Jordan L. Mott, N. Y., deposited by Williams & Hinds, Philadelphia. This range also received a premium at the last exhibition.

No. 1534, patent cooking range, by J. Beebe & Co., N. Y., and No. 1617, an eight boiler range, by Lloyd & Feltwell, Philadelphia, are also creditable articles.

Among the warm-air furnaces, for heating buildings, the judges notice:—

No. 1533, Fox's patent warm air furnace, by James Beebe & Co., N. Y., deposited by Peters & Co. This furnace is deemed worthy of a Second Premium.

No. 1655, hot air furnace, by David Culver, N. Y., deposited by C. & J. W. Clothier, Philadelphia. To this is adjudged a Third Premium.

A great variety of stoves for burning wood are exhibited. Among those of cast-iron, the most creditable for design and casting are,

No. 1639, Charles I. air tight parlor stove, by Ransom & Co., Albany, N. Y., deposited by North & Harrison.

No 1530, Stanley's parlor air tight stoves, by Warnick, Leibrandt & Co., Philadelphia.

The following air tight stoves of sheet-iron, for burning wood, are noted as worthy of commendation:—

No. 1507, Sexton's patent parlor wood stove, deposited by North & Harrison, and by Williams & Hinds.

No. 1671, several stoves, some with cast-iron bases, by F. Fœring & Co., Philadelphia.

A number of very creditable radiators are deposited by Fœring & Co., J. B. Kohler, H. G. Bartle, S. Kirby, and others.

No. 1640, a ventilating parlor coal stove, by J. McGregor, N. Y., deposited by North & Harrison. An excellent stove, in the form of air tight wood stoves, and in the use of which, a saving of coal will doubtless result.

No. 1515, air tight parlor stove for coal, by A. T. Dunham, Troy, N. Y., deposited by Cox & Boughton, Philadelphia. A cast-iron stove, with radiating flues; a very serviceable and good stove.

Nos. 1674–5, coal grate and port mantel, by Lloyd & Co., Philadelphia, are pretty designs, and of creditable workmanship; deemed worthy of a Second Premium.

No. 1725, French cook stove, by John McGuigan, Philadelphia. Made of tin, and intended for summer use—it appears to be admirably adapted for cooking with a very small quantity of charcoal.

No. 1637, a lot of fire bricks and cylinders for stoves, by H. Mann, Philadelphia. These appear to be excellent articles, and are worthy of creditable notice.

XII.—*Cabinet Ware and Furniture.*

It has been a subject of regret, at former exhibitions, that the display of cabinet ware was so limited, both in extent and variety; and this is the case, even in an increased degree, on the present occasion.

It seems singular that, in Philadelphia, where such a quantity of furniture is made, of every variety—both of the rich and costly as well as of the plain and serviceable, that the judges in this department should be called only to examine a few chairs, window blinds, and miscellaneous articles, to the amount of only about two dozen! The Committee are so fully impressed with this consideration, that they feel it their duty to suggest the propriety of increased exertion for the promotion of future exhibitions of this branch of productive industry. They believe that the means are ample, and only require proper efforts to bring them into view.

In this department, a First Premium is awarded to No. 1254, glass paper, made at the Eagle Works, Baltimore, and deposited by Oliver Evans, Philadelphia. This article is made of unmixed glass, put on in the best manner, and adhering with unusual pertinacity.

Each of the following is deemed worthy of a Second Premium:—

No. 400, buffalo hide glue, by Charles Cummings, Philadelphia. Remarkable for its fine quality.

No. 1267, fancy chairs, by Wm. Sanderson, Philadelphia.

No. 1329, a secretary book case, by Richard Mitchell, Newport, Bucks county, Pa. This article is considered to merit this award in encouragement of the efforts of the maker.

No. 1350, a marble-top table and chairs, by Quantin & Lutz, Philadelphia. The handsomest articles of the kind in the exhibition.

Third Premiums to the succeeding:

No. 1224, reed window blinds, by Martin Free, Philadelphia. Well prepared articles.

No. 1268, venitian blinds, by G. W. Zimmerman, Philadelphia.

No. 1289, furniture knobs, by Latting & Hanburger, Philadelphia.

No. 1301, fancy and invalid chairs, by A. McDonough, Philadelphia. Exhibiting his usual good work.

The following are considered as deserving of approbatory notice:—

No. 399, curled hair, by Charles Cummings, Philadelphia; of fine quality.

No. 911, sacking bottoms and awning wing, by Fox & Wagner, Philadelphia.

No. 922, sacking bottom, by J. H. Foster, Philadelphia.

No. 1290, venitian blinds, by L. Kunitz, Philadelphia. Well made articles.

No. 1315, hair spring mattrass, by E Foliot, Philadelphia. This is a good article, and deserves commendation. It is hoped that further improvement will be made in the manufacture of these desirable domestic conveniences.

No. 1330, a patent fan rocking chair, by Charles Horst, New Orleans, deposited by C. Gerke. An ingenious contrivance.

XIII.—*Musical Instruments.*

The number of pianos deposited was very large, and the judges on musical instruments devoted much time and labor to a careful examination of their respective qualities. In their report, they state that they were particularly embarrassed in their trials of the pianos, on account of the difference of pitch to which they were tuned, amounting, in some instances, to a full semi-tone—sufficient, where qualities approximated, to make it doubtful what might be the respective merits of tone if the pitch were identical. They suggest, as a remedy, that, in future exhibitions, no piano should be received for competition, unless tuned to a high concert pitch; by which, much of this trouble might be avoided.

Of the pianos in the present exhibition, the judges state, generally, that a majority of them, by six different manufacturers in this and other cities, have positive merits; showing progress in the art of construction. Except, however, in one instance, which will be hereafter mentioned, no novelty or improvement was observed of so distinct and important a character as to justify special commendation. In judging the pianos, results rather than means have been regarded; conceiving the best palpable tests of a musical instrument to be its musical capabilities: not its originality, its mechanical ingenuity, or that elegance of finish which affects neither the action nor the tone, and is designed to please the eye, not to satisfy the ear.

The judges, after devoting ten hours to examinations and comparative trials of the pianos exhibited, were unable to agree unanimously in a preference for any one. A seven octave square piano, No. 1276, made by Conrad Meyer, seeming, from the first examinations of the instruments in the positions in which they were placed in

the room, to be superior, was moved by the judges and placed side by side, successively, with the pianos of every other maker; and this comparison resulted in a decision, by a majority of the judges, that this is the best square piano in the exhibition. The ground of this decision was the general excellence of the piano, and especially its power and brilliancy. The judges recommend, and the committee award, in this case, a Third Premium.

For the second best square piano in the exhibition, No. 1291, by Schomacker & Co., a Third Premium is also awarded for the general excellence of the instrument, and especially for the agreeable character and purity of the tone.

A grand piano, by Schomacker & Co., receives the commendation of the judges as an excellent instrument; the bass and the highest octave having a volume and clearness as the qualities of the tone. A "detached sounding board" and a metal "sounding box" were pointed out to the judges, as improvements in Schomacker & Co.'s instruments. The sounding box appeared to add to the power of the strings to which it is attached. The sounding board, as an improvement, has been referred to the committee of the Institute on science and the arts, who have reported favorably upon its merits.

The judges desire it to be distinctly understood, that in the recommendations of awards above made, their decision was the result of very careful examination; and in singling out the pianos of two makers, as superior to others, they do so with the declaration that several other manufacturers have instruments deposited, which are altogether creditable to their skill, and respectively notable for some peculiar merit.

Two chamber organs are exhibited; one of which, No. 1264, by Corrie & Brady, is very complete for its size,—combining most of the qualities of a large church organ. For this a Third Premium is awarded.

No. 1223, a chamber organ, by Joseph Buffington, is commended for the "barrel attachment."

No. 1302, a case of flutes, by Pfaff, and No. 1249, another by Weygandt, are most creditable specimens of workmanship. Both these makers have received premiums at former exhibitions.

No. 1259, a valve trumpet and trombone, by G. Zoebish & Son, Nazareth, Pennsylvania, are considered worthy of a First Premium.

XIV.—*Glass, China, &c.*

The assortment of glass in this, as in several previous exhibitions, gives evidence that the importance of the art has called to its aid such talents and perseverance as continue its advancement. It is to be regretted that no china ware is exhibited;—and in earthenware the samples deposited fall short of a fair representation of the present condition of the art in this country.

No. 605, glass ware, by the New England Glass Company, Boston, Mass., deposited by Muzzey & Monroe, Philadelphia. In the display made by this company, we discern a new and beautiful feature.

They have succeeded admirably in producing beautiful tints of purple and blue, distributed on the surface of the flint glass, without mingling; so that it may be cut or engraved distinct in each color;—the edges of the cutting being smooth, and the finish complete. For the colored glass, in the exceeding delicacy and uniformity of its tints, a First Premium is awarded. Of the pressed and cut flint glass, the judges remark that it is equal to any heretofore exhibited by this company.

No. 604, a lot of glass, by the Boston & Sandwich Glass Company, Boston, Mass., deposited by Muzzey & Munroe. This company has received the First Premium at former exhibitions, and the quality and variety of their present deposit fully sustains their well established reputation for excellence in the various branches of their manufacture.

No. 638, glass ware, by the Union Glass Works, Kensington, deposited by Hartell & Lancaster, Philadelphia. This also presents something new. The articles, consisting chiefly of cologne and toilet bottles,—opal, turquoise, enamelled, green, chameleon, &c., were made in an open or hollow ware furnace, of bottle glass. Many of the tints are as rich as would be expected in flint glass, while the invoice price of the ware is so low that it must secure a constant demand. The hock, cologne, and toilet bottles, of colored opaque body, are considered as deserving a First Premium. The mineral water bottles in this collection are good.

No. 656, green glass ware, by Benners, Smith & Campbell, Dyottville. This is an assortment of carboys, demijohns, porter and mineral water bottles, &c. The demijohns are particularly well made, and worthy of a Second Premium.

No. 682, green glass ware, by Joel Bodine & Son, Williamstown, N. J., deposited by L. Voigt, Philadelphia. Mineral water and porter bottles, equal to any in the exhibition.

No. 651, Rockingham ware, by Harker & Taylor, East Liverpool, Ohio, deposited by A. C. Hyer, Philadelphia. If this ware maintains its quality in the variety usually made, as in the samples submitted, the manufacturer deserves substantial encouragement.

No. 723, goblets and finger dishes, by the Albany Glass & Porcelain Company, deposited by Curtis & Hand. Colored glass, tinged throughout the mass,—and a fair article. The makers are recommended to apply to the committee on science and the arts, for a further examination.

A number of samples of stained glass for windows were deposited; but of these much of the material and work is foreign. No. 686, by Jones & Sawtell, is said to be wholly American manufacture. No. 1241, by John Gibson, is highly creditable for artistical design. To each of these a Third Premium. The judges look with confidence to a great improvement in stained glass at an early period.

XV.—*Books and Stationery.*

The judges appointed to examine the articles in this department, report, in substance, as follows:

No. 51, book-binders' dies, by Gaskill & Copper, Philadelphia. The most perfect specimens of this kind of work ever exhibited, and worthy of a First Premium.

No. 105, book-binding, by J. B. Lippincott & Co., Philadelphia. Quarto Bibles and Books of Common Prayer, in very superior velvet binding, showing many decided improvements upon any thing the judges have seen. In style of finish, excellence of work and materials, in the manner of fitting the clasps,—the superiority of edge gilding, in the joints, &c., they are greatly in advance of any work heretofore seen by the judges. They are justly entitled to the First Premium.

No. 107, book-binding, by Joseph T. Altemus, Philadelphia. Creditable specimens of fine binding. The judges particularly notice a quarto copy of the "Floral Offering" as a beautiful specimen of fancy binding, and entitled to a Second Premium.

No. 45, samples of ink, by A. W. Harrison, Philadelphia. This article has been tried by one of the judges for two years, who finds it to be a very superior ink. It is deemed worthy of a Second Premium.

No. 121, patent inkstands, by J. B. Lippincott & Co. A decided and great improvement upon the inkstands heretofore made upon this principle. A Third Premium.

No. 104, plates for letter copying, by Geo. Burnham, Philadelphia. These plates were tried, and found to answer the purpose admirably. They deserve a Third Premium.

The judges also speak favorably of No. 22, ruling pens, by W. O. Hickok, Harrisburg, Pa., and No. 46, cases for jewelry and surgical instruments, by N. A. Simons & Co., Philadelphia.

XVI.—*Paper Hangings.*

It will doubtless surprise many to learn that at an exhibition of domestic manufactures, held in Philadelphia, a city celebrated for the quantity and excellence of the paper hangings made within it, not a single article of the kind was deposited. We would more willingly account for this by supposing that our enterprising manufacturers of this article are so fully engaged in the supply of orders from customers, that they have forgotten the exhibition,—than to attribute the neglect on their part to any want of zeal or disposition to encourage these displays of the progress of American skill and improvement in the useful arts.

XVII.—*Fine Arts.*

The collection of specimens under this head is not as extensive or as creditable to the taste and skill of the artists as could be desired, and the judges express a regret that the articles offered for exhibition do not give evidence of that progress which those who feel an interest in the advancement of the fine arts would desire to see. These general remarks apply to the collection as a whole:—there are, however, a few specimens of very deserving merit.

No. 1205 & 1206, drawings in India ink, by A. M. Wiggin and J. R. Whitney, pupils of the high school. These specimens are highly creditable to the young artists. We hope to see more specimens of this style of drawing in future exhibitions.

No. 1203, crayon drawings, by Francis Mitchell. Very handsome specimens. Of the drawings deposited by pupils of the high school, it may be generally remarked that they are very creditable to the school and to the teachers.

No. 1216, a tulip, in water colors, by Miss Taylor. A beautifully executed work.

No. 1217, transferred engravings, by Frederick Bourquin, Philad. These are highly meritorious: not for any new invention or discovery; but for the great neatness, beauty, and accuracy of execution. A Third Premium.

No. 1236, classic figures, by Edward Dufrene, Philadelphia. It is understood that these are models. If so, they are works of merit, and the artist should be encouraged. A Third Premium is awarded.

No. 1246, stucco work, by W. H. French. Chaste and beautiful designs, with workmanship of the best character.

No. 1226, crayon drawings, by M. Beaugureau. These, in manipulation and fine finish are very superior, though the drawing is somewhat stiff.

No. 1261, crayon drawings and paintings, by Ph. Beaugureau, a son of the above mentioned artist. His work has the same character of exquisite finish with that of his father. This promising young artist received a premium last year.

No. 1269, engraved portrait of Benjamin West, by Samuel Sartain. A work very creditable to a young artist.

No. 1299, "Tachygraphic Painting," by J. B. Hall, Cincinnati. This is claimed as a new invention; but until brought to a greater state of perfection than at present, it would be difficult for the judges to form an accurate estimate of its value as a discovery, or of the perfection to which it may be brought by the skill of the artist.

No. 1310, painting on porcelain, by M. Strasser, Philadelphia. Well executed specimens of this style of painting.

No. 1322, engraving on wood, by J. H. Brightly, Philadelphia. This shows great boldness and skill in execution, and for so large a work is very superior. It merits a Third Premium.

No. 1244, ornamental penmanship, by W. J. Canby, Philadelphia. This the judges consider as the best writing exhibited.—Next in order they rank that by George Stimpson of Boston, which has the merit of great freedom and boldness of execution. Specimens by W. P. M. Ross were not received in time.

Daguerreotypes.—In this department there are some very excellent specimens in the exhibition, and the judges think they see a progressive improvement in this branch of art. They have not recommended an award in favor of any of the competitors; but are disposed to rank as first in order, the collection of McClees and Germon as containing the largest number of superior specimens. Next to these they

place those by M. P. Simons,—which, however, are closely followed in excellence by those of M. A. Root. The collection of Langenheim is much smaller than at former exhibitions; but shows pieces of great merit.

Although the judges do not consider this department as strictly belonging to the Fine Arts, still good collections of specimens are attractive and add to the interest of our exhibitions.

XVIII.—*Jewelry and Silver Ware.*

The show of goods in this branch of manufacture is much smaller than on many former occasions. The judges appointed to decide on the comparative merits of articles deposited in this department, report that they have found nothing of peculiar excellence, exceeding what has been shown at former periods.

In the two cases deposited by Bailey & Co., Philadelphia, containing a variety of silver ware, the judges notice some samples of good hammering and fine chasing; the work being, in general, creditable to the makers, and sustaining the reputation formerly acquired. The bracelet and pin, No. 707, in the same collection, are beautiful specimens of that kind of work, and attract admiration by the brilliancy of the diamond, and the style and taste of the setting.

No. 685, a case by H. & W. Dubosq, Philadelphia, contains a great variety of small articles of silver ware, consisting of combs, card cases, hair pins, &c., which are creditable specimens of that kind of work.

No. 724, an assortment of gold pens, by Bard & Bro., of Boston and New York. These pens were carefully tried and examined: they are well finished, and are pronounced by experienced writers to be excellent for use. They deserve a Third Premium.

XIX.—*Marble Work.*

The place allotted to this branch of mechanical industry has, in more than one of our latter exhibitions, shown a very limited assortment; nor is the display of the present year by any means so varied and extensive as might be expected in a city where so large an amount of excellent work of this kind is produced.

No. 1501, a marble table, by Michael Casey, Harrisburg, Pa. This is made from a "conglomerate marble" found in Lancaster county, similar to the Potomac marble. It is a good specimen, but a higher polish is required to make it desirable as a material for furniture.

No. 1590, marble work, by Thomas Hargrave, Philadelphia. A monumental base and die, on which reclines the figure of an infant, in a sleeping posture. The workmanship on base and die is well done. The infant, being the work of an artist, should have been referred to the judges upon fine arts. Two lambs, by the same artist, should have had the same reference. In the same lot is a head stone, of Italian marble, with a carved wreath of flowers, enclosing a name in raised letters. The carving is tolerably well executed—the lettering is not so good.

No. 1742, three marble mantels, by John Eckstein, Philadelphia.

Of the white Italian marble mantel, of the style of Louis XIV, the judges remark that they have seen mantels of this style in a neighboring city, much more costly and of somewhat higher finish; but consider the present a creditable piece of work, for the skill shown in its execution, and the expense incurred in getting it up. The black and gold Italian marble mantel is of good material and workmanship.

XX.—*Hats and Caps.*

From the enterprize and spirit recently manifested by the manufacturers and dealers in this branch of business, a much more extensive exhibition of hats and caps was anticipated than that which actually appeared. The judges express their regret at this apparent apathy of those in the trade from whom more was expected; a number of whom have heretofore merited and received the awards of the Institute; thus profiting by their attention to former exhibitions.

No. 926, men's and boys' caps, by W. P. Erhardt, Philadelphia. Well and neatly made. One of these caps deserves some notice on account of its convenience. One side is of cloth, and the other of oiled silk, and either can be worn outside at the pleasure of the wearer. This, so far as the judges know, is the first instance of such an arrangement applied to caps.

No. 1000, hats and caps, by Samuel Hudson, Philadelphia. Well made and creditable to the manufacturer. One silk hat, in particular, for Friends' wear, is adjudged worthy of a Third Premium.

No. 1026, hats, caps, and furs, by T. B. Florence, Philadelphia. Creditable for their variety and good make. One silk hat in this assortment, from its excellence in all respects, is considered to deserve a Third Premium.

No. 1036, two silk hats by Evan Morris, Philadelphia. These hats, in the opinion of the judges, are entitled to much consideration from their perfection in make, style, neatness of finish, trimming, &c. They are indeed of superior workmanship, and Mr. Morris being an actual *manufacturer* of hats, is entitled to the First Premium.

No. 1035, one silk hat, deposited by A. H. Titus. The judges suppose this to be either the production of a very young apprentice to the business, or deposited for the purpose of obtaining free admission to the rooms. It has been worn, and is destitute of merit in all respects.

The hats by Charles Bulkley, E. S. Williams, Geo. Babe, B. Stratton, and Foster & Gebhard, are all creditable to them as manufacturers.

The furs deposited by John Davis, Samuel Louis, Solis & Brother, and by Thomas B. Florence, are beautiful specimens of productions in this line. Those of Mr. Davis are thought to be rather superior in workmanship, but the judges feel much delicacy on this point, all being so well put together.

XXI.—*Combs and Brushes.*

The collection of goods in this department of the exhibition is extensive in quantity and variety, embracing many articles of superior

quality. We are gratified to perceive among them tooth brushes—an article, in the importation of which, large sums of money have been heretofore expended. From the report of the judges appointed to examine the articles under this head, we compile the following:—

No. 1046, brushes, by Abel & Bicknell, Philadelphia. For superiority and perfection of workmanship, and for beauty of style and pattern, these are considered worthy of a First Premium.

No. 934, brushes, by the male pupils of the Pennsylvania Institution for the Blind. These merit honorable distinction for excellence of workmanship, considering the circumstances under which they were manufactured.

No. 1003, shell combs, by Septimus Winner, Philadelphia. Remarkably excellent; distinguished for their workmanship, and for beauty and variety of style and pattern. They merit a First Premium.

No. 904, fancy combs, by Wm. Redheffer, Philadelphia. For perfection of workmanship, and for beauty and style of pattern, considered deserving of a Second Premium.

No. 919, combs, by Thomas Simpson, Philadelphia. A variety of well finished and creditable articles. Worthy of favorable notice.

An assortment of excellent brushes, by Edward Clinton, Philadelphia, was not received in time for competition.

XXII.—*Coach Work.*

Our enterprising carriage builders have, this year, graced this department of the exhibition with an assortment of vehicles which is not only highly honorable to the trade, but has also been a source of gratification to the public, as one of the most attractive features of the exhibition. On very few former occasions has so much elegant and substantial work in this line been exhibited.

After careful examination and consideration, the judges in this branch have recommended First Premiums to the following:-

No. 1579, a French phæton, by Wm. Dunlap, Philadelphia. For symmetry, good workmanship, and fine finish.

No. 1713, a Clarence coach, by Williams Ogle, Philadelphia. For good workmanship and elegance of finish. Mr. Ogle, being a member of the Board of Managers of the Institute, is prohibited, on this account, from receiving a premium.

No. 1594, York wagon, by Joseph Ruch, Philadelphia. For excellent workmanship and tasteful finish.

No. 1614, Columbian fire engine, No. 14, New York, by John Agnew, Philadelphia. For superior workmanship, elegance of painting, and general finish.

No. 1549, Northern Liberty hose carriage, by John Agnew, Philadelphia. For symmetry, good workmanship, and elegant finish. These two premiums, recommended for Mr. Agnew, cannot be granted, according to a rule of the Institute, which forbids an award to any member of the Board of Managers.

No. 1510, a brewer's dray, by William Snyder, Philadelphia. For strength and superior workmanship.

No. 1550, a cart for weighing coal, or other loads, by J. A. Stewart, Philadelphia. A very ingenious affair, and of excellent workmanship.

And a Second Premium to Robert B. Scott, of Philadelphia, for a cart, of very substantial and good material and workmanship.

The judges notice No. 1740, four carriages, by Geo. W. Watson, Philadelphia, as very tasteful, and of excellent workmanship; equal to those formerly exhibited by him.

Also, a York wagon, by W. Dunlap, and a light wagon, by Williams Ogle—both considered very creditable articles.

XXIII.—*Leather and Morocco.*

The judges appointed to examine these articles recommend a Second Premium to each of the following:

No. 330, Spanish hide sole leather by Francis Shriver, Westminster, Maryland, deposited by A. Ruth, Philadelphia. A superior article,—well tanned and remarkable for its solidity in the shoulders and offal parts. Though not much superior to that exhibited by the same manufacturer last year, he continues to excel.

No. 319, calf-skins, by Fell & Kinsler, Philadelphia, and No. 355, calf-skins, by H. M. Crawford, Philadelphia. These two lots attracted the particular attention of the judges, and were pronounced equal to any imported; though not much superior to specimens at last year's exhibition. They are elegantly soft, smooth, black, and glossy,—and not easily rumpled.

Third Premiums to the two following:

No 309, slaughter sole leather, by R. T. Downing, Monroe county, Pennsylvania, deposited by E. Levick & Co., Philadelphia. Well tanned and solid;—having all the characteristics of superior leather.

No. 356, calf-skins, by Samuel Miller of Berks county, Pennsylvania, deposited by J. T. Kirkpatrick & Co., Philadelphia. These, though somewhat deficient in finish, the judges believe to be well tanned; and for the tanning the premium is awarded.

Concerning No. 302, slaughter sole leather, by Charles B. Williams, and No. 303, the same, by W. H. Crawford, the judges remark that they perceive no difference,—nor any improvement over last year;—though they consider both lots highly creditable for the general quality of the leather, and worthy of favorable notice.

No. 373, South American kid, by G. & H. Moore, Philadelphia: worthy of notice, being black, soft, smooth, and glossy.

The enamelled leather, by Pugh, and also that by Levick & Co., is considered creditable; but not superior to some offered at former exhibitions.

XXIV.—*Boots and Shoes.*

In this department, the assortment of boots and shoes for men's wear is highly creditable to the manufacturers, and though there is no particular improvement in make or style to warrant an extended notice, yet the general excellence of the articles exhibited manifests a

continued progress in the craft. The judges notice with satisfaction the increased use of steel shanks, and recommend them as being calculated to preserve the form of the boot, and to insure ease and comfort to the wearer.

The meagre exhibition of ladies' boots and shoes, in a city so celebrated for excellence in this branch as Philadelphia, can only be accounted for by the fact that our manufacturers have been unable to supply the demand for the fall trade, and have thus been compelled to neglect the exhibition of the Institute.

Third Premiums are awarded as follow:

No. 378, boots and patent Downings, by Caspar Benkert. In workmanship the boots excel all others in the exhibition; while the style and general excellence is very superior. The same remarks will apply to the patent Downings.

No. 394, boots of various patterns, by Leonard Benkert;—all of excellent quality. The patent Downings are a beautiful article.

No. 434, fine calf stitched and water-proof boots, by McCurdy & O'Reilly. Excellent in point of taste and elaborate finish,—and in general appearance beautiful.

The following receive commendable notice from the judges:

No. 316, calf and gaiter boots, by John Heumann. Excellent articles, of good quality and style.

No. 353, boots, by N. Haywood & Co., neat and substantial.

Nos. 382 and 395, spring shanks, by Jon. Russell, and by J. McGinley, a good article.

No. 385, men's lasts, by John Williden. General finish remarkably fine.

No. 427, boot and shoe expanders, by Geo. Kemp. An admirable article.

No. 436, boots, overshoes, and gaiters, by Andrew Vetter. Neat and good.

No. 438, clogs for walking on ice, by J. Powell. The best article for genteel wear that has been seen by the judges.

No. 440, ladies' slippers, and lasts for French shoes, by Wm. Meyers. Good articles.

Gunning and hunting shoes, of good design and make, by J. Powell, were not entered in time for competition. They might have received a premium, if brought earlier.

XXV.—*Chemicals.*

The display of chemicals is this year much finer, as regards quantity, variety, and excellence, than in any former exhibition; and the thanks of the Institute are due to the depositors generally, for the beauty and excellence of their preparations. The following is a summary of the report presented by the judges appointed to examine the chemical articles in this exhibition.

First Premiums are awarded as follows:

To No. 332, a very fine and large lot of crystals of yellow prussiate of potash by H. W. Worthington, Philadelphia. The abundance of the specimens testifies to the extensive scale upon which the manufac-

ture is conducted, while the large and well defined crystals manifest its purity.

No. 384, red prussiate of potash, by Carter & Scattergood, Phila., of very superior quality, and in excellent crystals. On account of the excellence of the preparation and the importance of the article, the Premium is awarded.

No. 375, chemicals, by Farr, Powers, & Weightman, Phila. This lot is very large, and of a very high order of excellence,—surpassing any other in the exhibition. The following articles have been carefully compared by the judges with all others exhibited, and pronounced to be the best: precipitated carbonate of iron; tannin; salt of tartar; corrosive sublimate; piperine; sulphate of quinine; white and red precipitates; tartrate of iron and potash; nitrate of silver; and sulphuret of potassium. The following are of very superior quality, but are the only specimens of the kind in the exhibition: morphia; hyposulphite of soda; vermilion; muriate of tin; calomel; citrate of potassa; acetate of morphia. The other organic preparations are also of very excellent quality. In one or two of the preparations they are, however, surpassed by Wetherill & Bro. (312.) and by Smith & Hodgson, (430.) Considering that at every exhibition of the Institute, for some years, the excellence of the preparations by Farr, Powers, & Weightman has entitled them to the First Premium;—considering also the great extent and vast importance of their manufactures, the judges earnestly recommend to the Committee on Exhibitions to request the Institute to award to Farr, Powers, & Weightman a Gold Medal, as a testimony of the excellence, extent, and importance of their manufactures. Should this not be thought proper, the judges recommend for them the First Premium.

No. 430, chemicals, by Smith & Hodgson, Phila. A very excellent lot,—maintaining the high reputation which this firm has acquired. The judges notice, as particularly worthy of remark, oxide of chrome, lactate of iron, valerianate of zinc, chromic acid, sub-oxide of copper, gallic acid, tannin, and strychnia. The specimen of phosphate of iron, and the samples of acids, are the best in the exhibition. The First Premium is awarded for the general excellence of these articles.

To each of the two following, a Second Premium:

No. 312, chemicals, by Wetherill & Brothers, Phila., including many of very superior qualiiy,—among which the judges notice particularly, the very beautiful crystals of tartar emetic, the sulphate of potassa, phosphate of ammonia, and citrate of iron, as being the best exhibited. The volatile oil of juniper is also very fine, while some other of the preparations cannot be considered as of the first quality.

No. 411 to 422, chemicals, by Harrison, Brothers & Co., Phila. A lot, of very handsome appearance. The crystalized sugar of lead is especially deserving of notice for the beauty of its color and crystalization. There is also a fine block of alum, from the crystalizing vat, weighing 500 pounds;—and a very fine specimen of green vitriol, which is the best in the exhibition. They also exhibit red and iron liquor, and pyroligneous acid, in which there is no competition.

A Third Premium to No. 306, iodide of lead, and deutiodide of

mercury, by E. L. Smith & Brothers, Phila. These specimens are small; but the judges believe them to be the best of the kind in the exhibition. The cyanide of potassium has been less carefully prepared.

The judges remark that in recommending these premiums they have been guided by the following considerations:—1st, The purity of the preparation. 2nd, Its importance in the arts. 3rd, The scale upon which it is made.

Of many other articles, among which are the following, they speak in terms of commendation; No. 307, calcined magnesia, by James Burns; 308, deutiodide of mercury, by H. M. Troth; 318, do. and iodide of lead, by S. M. Bines; 325, compound extract of colocynth, by John Cotterell; 341, machine spread plaster, by C. Shivers; 377, crystals of yellow prussiate of potash, by J. L. Crew; 423–4, iodide of lead and oxalate of ammonia, by H. A. Guier.

Black writing ink, by Thomas; blue do., by Rogers; printing ink, by Thornton; snuff, by Demuth; and shoe blacking, by a number of different manufacturers, all appear to be good of their kind.

No. 322, a box of starch, by Altemus; and No. 389, pearl starch, by Colgate, are both good. The judges believe the latter to be the best.

No. 374, a specimen of proto-bromide of mercury, by Drs. Alter & Gillespie, of Pittsburg, made from the bromine obtained from the salt springs of that region, is a fair sample of the salt, and an interesting addition to the manufacturing wealth of our country.

No. 361, oxide of cobalt, of two different qualities;—and specimens of the solutions, by Coffin & Booth, Phila. This is believed to be the first successful attempt to refine cobalt in this country,—and the article is of such extensive use, especially in the manufacture of glass and porcelain, as to make the manufacture an important one. The article has not yet come into sufficiently general use to allow the judges to express an opinion of the purity of the preparation; but it deserves notice from its importance.

No. 410, mineral water, by E. Roussel, and No. 402, do., by W. Riddle. The judges, after examination, are satisfied of the great superiority of the first of these lots; and their judgment is the same in reference to the two winter drinks, nectar, by Roussel, and ambrosia, by Riddle,—which are compound syrups, dissolved in mineral water. Considering the well established superiority, which Roussel has for years maintained in the preparation of mineral water,—the immense amount of it which is made,—and the very great and beneficial influence which so pleasant and salutary a beverage must have upon the habits of the people, the judges deem No. 410 worthy the award of a First Premium.

No. 365, alcohol, deodorized, by E. Roussel. This specimen is of excellent quality, and is interesting in consequence of the result,—a high degree of concentration being obtained by a single operation, with no other agent than charcoal.

XXVI.—*Philosophical Apparatus.*

The assortment of philosophical apparatus is not large; but a number of the principal articles are characterized by great skill and ingenuity. It is to be regretted that the makers of this kind of work do not more generally exhibit, as it is confidently believed that not only the condition of their respective arts, but also their own interests, would be promoted by so doing.

No. 622, scales, weights, and measures, by F. Meyer & Co., Philadelphia. The makers deserve great commendation for the enterprize and skill evinced in the construction of the large balance, intended for the adjustment of standard county weights and measures. It is constructed, principally, after the late Mr. Hassler's arrangement; but is improved by a modification of the method of Mr. Peale, of the U. S. Mint, for causing the pans to be lifted always from the same points, when the beam is brought to rest on its knife-edge. For this balance, we award a First Premium. The standard weights and measures were exhibited last year—they are perfect copies of the U. S. standards, and leave nothing to be desired. The scales for grocers' and druggists' use are very neatly finished instruments.

No. 713, a "lightning exhauster," invented by J. D. Reid, of the Telegraph Office, Philadelphia. This is a very ingenious contrivance for obviating the destructive effect of atmospheric electricity on the electro-magnetic telegraph apparatus. For its ingenuity, neatness, and utility, we award a First Premium.

No. 621, slides for magic lanterns, by Henry S. Nolen, Philadelphia. Believed to surpass the European paintings of the same kind, in accuracy of design, and in clearness and delicacy of execution. A Second Premium.

No. 623, portable Daguerreotype apparatus, invented by A. C. Harrison, and deposited by Elliott & Gunn, Philadelphia. An ingenious and compact arrangement, exceedingly convenient for travelers, obviating the necessity of making a dark room at every place of operation. Deemed worthy of a Second Premium.

No. 668, single, double, and triple complex re-acting electro-magnetic machines, invented by Moses Chase, deposited by A. F. Porter, Philadelphia. In these, there is an ingenious contrivance, for moderating, at pleasure, the intensity of the shock, and also for directing the current to several parts of the body at the same time. A Second Premium.

No. 650, electro-magnetic machine, for producing motion, by D. Lippincott, Philadelphia. A very prettily contrived instrument, but not new. A Third Premium.

No. 687, electro-magnetic machines, by W. C. & J. Neff. Very creditable in point of finish.

No. 613, lightning rod points, by T. Armitage, have been referred to the Committee on Science and the Arts.

XXVII.—*Straw Goods.*

The deposit of goods in this line is very limited; but the Committee

express a hope that, as straw bonnets and hats are now largely manufactured in this country, we shall, hereafter, see, in our exhibitions, a greater variety and more creditable samples of this branch of the mechanic arts.

No. 918, palm leaf hats, by Rice & Wasson, Boston, deposited by W. E. & J. G. Whelan, Philadelphia. These are purely of domestic manufacture, and fair specimens of their kind. The judges hope for more competition in future in these goods.

No. 936, Florence and pearl straw bonnets, by John T. Walton, Philadelphia. Of foreign material.

No. 965, "Chapeau Pamela" bonnets, by Mrs. Susan Kendall, New York. Deserving of attention for the purity of the stock, beauty of shape, and general finish. They merit a Third Premium.

XXVIII.—*Surgical Instruments and Dentistry.*

This department also contains but a meagre display, and the judges regret the paucity of appropriate objects for their examination and decision.

No. 640, an artificial leg, by Kretschmar & Gildea, Philadelphia. Very well made, and calculated to perform its duty with comfort to the wearer.

No. 639, by Dr. A. W. Patterson, and No. 700, by B. C. Everett, two varieties of trusses for hernia, both of which will be found excellent in appropriate cases; but neither being of universal adaptability.

No. 672, invalid spring bed, by B. Eastman. A good apparatus; but expensive and complicated.

No. 696, dental instruments, by Goodwin. Their merit consists in being made by the dentist himself.

No. 689, by Jones, White & Co., and No. 666, by C. T. Goodwin. Two machines for grinding artificial teeth, of which the first named is very good and well made.

A number of specimens of artificial teeth were exhibited by different depositors, of which the judges consider No. 696, by Goodwin, to be undoubtedly the best.

No. 697, natural teeth, plugged in the mouth, by Dr. Thomas W. Evans, [illegible]aster, Pa. This work is done in a superior manner, and by a ne[illegible]thod. Dr. Evans, the operator and discoverer, presented to the ju[illegible] abundant evidence of the truth of his statements, and of the exce[illegible]nce and novelty of his plan. Believing that his industry and ingenuity deserve a reward, he is adjudged a First Premium for his improvement in the art of plugging decayed teeth.

XXIX.—*Soaps and Perfumery.*

Of this department it may be remarked that the display greatly exceeds that of last year, although, in regard to the number of contributors, it falls short of some previous exhibitions. It is a subject of regret that the soaps, oils, &c., used in common life, and for domestic purposes, are so sparingly offered to the public eye at our exhibitions; when we know that they are manufactured extensively among us,—

and that their quality will compare favorably with the same kind of article of European make.

The following is an abstract from the report of the judges:

No. 363, a large block of palm soap, and small cakes of soap, by J. R. Graves. Of good quality and color,—free from excess of alkali,—and fully equal to specimens formerly exhibited.

No. 390, pale soap, by W. Colgate & Co., N. Y., deposited by M. Clark, Phila. Of excellent quality compared with ordinary common soaps,—and of superior color.

No. 331, sperm candles, cake spermaceti, and oil in jars, by B. B. Myrick, Phila. The spermaceti, both in mass and in candles, is very superior. It is of a pure white color, and very free from oil, which, together with its marked crystaline structure, indicate great purity. The whale oils are well bleached and very clear; the sperm oil, a fair color.

No. 435, a large lot of perfumery and fancy soaps, by Thomas Worsley, Phila. In this assortment are many creditable articles, both in quality of goods and in the style of putting them up. For the fancy soaps he is awarded a Second Premium.

No. 365, a large and tastefully arranged display of perfumery and fancy soaps, by E. Roussel, Phila. The present exhibit by this manufacturer, not only equals those of previous years, but, if possible, surpasses them. Among the more striking articles are busts of Washington and Franklin, modelled of pure white soap, resembling Carrara marble; and national columns of white and colored soaps, with appropriate devices, ingeniously and tastefully executed. The shaving cream, almond and rose soaps, and perfumed extracts maintain their unsurpassed excellence. In consideration of the superior excellence of the articles exhibited on the present occasion, a First Premium is awarded.

No. 747, a dentifrice, by J. A. Wadsworth, Providence, R. I. The style in which this article is put up cannot be too highly commended, and the judges would make an award for the display; but this being an article liable to produce a medicinal effect, with the composition of which they are unacquainted, they cannot consistently do so. They remark, however, that it possesses the external qualities which are desirable in a dentifrice.

XXX.—*Gum Elastic Goods.*

In the department of Caoutchouc goods there is this year a deficiency in quantity, and from a view of the deposits the inference would be that this branch of manufacture was on the decline. Not only, however, is the contrary known to be the case; but it is also known that in this department of art our country surpasses Europe. The present meagre exhibition of this kind of goods is the more to be regretted, as it was fully understood that a large assortment of interesting and useful articles was to have been presented.

No. 342, India rubber coat; Nos. 346–7, long gloves and mitts, by the Naugatuck Company, Conn. Nos. 343–4, Poncho, and air tight traveling bag, by Wm. Rider & Brother, Harlem, New York.

Nos. 345-8-9 and 50, life preserver, and India rubber maps, by Goodyear & Ely, New York, with other goods by different makers—all deposited by Wm. G. Steel, Phila. This assortment, generally, sustains the high character which these goods have acquired. The long gloves and mitts, with the coat, Poncho, and traveling bag, are noticed by the judges as superior. The smooth black surface of the gloves and mitts, without the intervention of a cracking varnish, deserves much praise. For this decided improvement in the surface and finish of India rubber goods, as exhibited by the gloves an mitts, we award a Third Premium.

No. 362, a case containing India rubber shoes, deposited by H. Tilden, not being open, the judges were unable to examine the goods.

No. 1555, hemp hose, by Amasa Stone, is an excellent article.

XXXI.—*Copper, Brass, and Plumber's Work.*

The judges appointed to examine articles of this kind, notice as follows:

No. 1723, a chime of eleven large bells, made for St. Philip's Church, Charleston, S. C., by T. J. Dyre, Jr., Phila. These bells are remarkable for the excellence of the casting, and being brought in just as they were taken from the mould, they have not yet been tuned; but competent judges of the tone think the moulder has been very successful in making each bell so near the proper note. Believing this to be the first chime of large bells ever made in Philadelphia, and considering also the beauty of the workmanship, we award to the maker a First Premium.

No. 1701, brass castings, by J. H. Miller, Philadelphia; figures and ornamental work, very neatly executed.

No. 1688, copper rivets and burs, for making hose, by J. & D. Sellers, Phila.; a very good article.

XXXII.—*Tin Work.*

The number of depositors in this line is this year somewhat increased; but still falls far short of what might be expected in a city where so much excellent tin work is made.

No. 1568, tin ware and domestic utensils, by Isaac S. Williams, Phila. This work is well done, and equal, if not superior, to former specimens by this well known manufacturer. The judges have recommended a Third Premium; but Mr. Williams being a member of the Board of Managers, a rule of the Institute forbids the award.

No. 1689, planished and japanned tin ware, by Thomas Butler, Phila. Well made work. The dish covers deserve particular notice; and the assortment is considered worthy of a Third Premium.

The judges observe concerning both these lots of tin ware, that they cannot, at present, see how work can be better made, unless by an improvement in the handles and feet of the different articles, which do not correspond with the excellence of the other work. They also suggest that some experiments should be made in order to improve the polish of tin ware,—believing this to be possible.

XXXIII.—*Paints and Colors.*

The assortment of articles deposited under this head at the present exhibition, is highly creditable to the manufacturers. The following notices are extracted from the report of the judges entrusted with the duty of examining this department.

No.—Chrome yellow, white lead, orange mineral, and red lead, by Wetherill & Brothers, Phila. The chrome yellow is of excellent quality, and equal to the best imported. The red lead is superior in tone of color to any exhibited, and worthy of the First Premium. The orange mineral is very good, but not as fine in orange color as some exhibited.

Nos. 415 to 419, white lead, dry, and ground in oil; red lead; litharge; and orange mineral, by Harrison, Brothers, & Co., Phila. All of good quality. The orange mineral, on account of its brilliant color, is worthy of the Second Premium. The litharge also deserves a Second Premium.

No. 431, white lead, red lead, and litharge, by Cuthbert & Wetherill, Phila. The red lead in this lot is worthy of a Second Premium, and the litharge of a Third Premium.

Nos. 379 and 380, white lead, dry, and ground in oil, by R. & J. Wharton, Phila. Both of beautiful quality.

The judges remark, that upon examining the specimens of white lead by Wetherill & Brothers, Harrison, Brothers, & Co., Cuthbert & Wetherill, and R. & J. Wharton, they find all excellent in quality, and quite equal to the best of English manufacture;—without material difference enough to give a preference in favor of any of these depositors.

No. 409, black graphite paint, by J. Weisman, Phila. An excellent article for painting iron work, tin roofing, &c.

No. 432, varnishes, by C. Schrack, Phila. These appear to deserve the well earned reputation which they have for a long time sustained in the market. No. 437, steam putty, by the same maker;—of excellent quality.

XXXIV.—*Fancy Goods.*

In this extensive and varied department, the judges perceive but little difference from the exhibitions of the past two or three years. As usual, many tasteful and well-made articles are on the list referred to them; while a great many others are not distinguished by any merit, ther in the design or workmanship.

No. 913, military ornaments, by Pinchin, are very good, and fully equal to those for which he received a premium last year.

No. 920, bead bags and purses, by L. E. Massey. Workmanship and designs very superior, and the articles equal to any imported. They are judged worthy of a First Premium.

No. 930, fancy feathers, by Mrs. Griffith. Beautiful and well made. The maker received a premium at a former exhibition.

No. 933, articles made by the female pupils of the Pennsylvania Institution for the Blind. Admirable, considering by whom executed.

A Second Premium is awarded to the pupils, generally—and to Miss Cruser, a blind pupil, for a bead vase, containing flowers, a Third Premium.

No. 947, baby jumpers, cradle, and elastic swing, by J. T. Townsend. These display much taste in the design, improvements, and finish; and are very well made and useful articles, highly creditable to the maker, who is the only depositor of articles of this kind.

No. 949, hair work, by F. J. Dressler. Very beautifully executed, and worthy of a Second Premium.

No. 974, artificial flowers, by J. D. Brown. These the judges consider as the best American flowers made; many of them are equal to the French. The present specimens sustain the well deserved reputation of the manufacturer, who received a first premium for the same kind of goods on a former occasion.

No. 986, a case of wigs, by L. Cabale. Excellent and well made articles.

No. 1024, wigs, hair brushes, and craniometer, by Bogue & Fawcett. The hair work is tastefully and well made. The "ventilating wig" appears to be well calculated for coolness and pleasantness of wear, as well as durability. The craniometer is apparently a useful contrivance for measuring the head; but the judges profess to have little knowledge concerning its use.

No. 1028, Odd Fellows' regalia, by J. W. & E. D. Stokes. Very well executed, but not superior to that shown at former exhibitions.

No. 1045, tinseling, by John Bezard. Deserving of notice for its good execution.

No. 1051, a large assortment of pickles, by T. B. Smith. Done up and displayed in his usual excellent style. The present deposit is considered fully equal to that for which he received a first premium on a former occasion.

No. 1052, bead bags and purses, by Mrs. C. S. Moore. Very well made indeed; but not considered equal to No. 920.

No. 938, artificial flowers, by E. Bright. Good; but not equal to No. 974.

No. 937, plumes, by Mrs. Mench. Deemed beautiful specimens by the ladies who assisted the judges in their examinations.

No. 1029, cleaned kid gloves and laces, by A. H. Cooper. The cleaning of these articles is performed on a patent machine, with the operations of which the judges are not acquainted. The work appears to be well done, and deserving of notice.

No. 962, cleaned gloves, by A. Moore. Of fair appearance.

XXXV.—*House-Keeping Articles.*

In this branch of the exhibition, the judges remark that there is but little competition, though the articles are generally well made, and of a useful character.

No. 1551, washing machines by Porter & Graeff; and 1621, washing machines, by Lukens. Similar to those deposited last year.

No, 1651, a mangling machine, by William Baylis, Philadelphia.

There is an improvement in this mangle over those made on the old plan. This is in the beam, by which the labor of the operator is lessened. We recommend this machine to public notice, and award to it a Second Premium.

No. 1607, wooden ware, by William Boyer, Philadelphia; consisting of tubs, safe, &c. Well made articles. Also, a nursery chair and basket; worthy of notice for neatness.

No. 1642, improved barrel churns, by Edward Spain, Philadelphia. For those excellent articles the maker received a premium last year.

No. 1512, flour, manufactured by Beaumont & Hollingsworth, Zanesville, Ohio, deposited by Ridgway & Budd, Philadelphia, and No. 1557, flour, by R. Richardson, Rochester, N. Y., deposited by Caleb Clothier, Philadelphia. Both these specimens of flour are of truly excellent quality—and the judges, after a thorough examination, were scarcely able to decide between them. A portion of the flour from each barrel was made into bread, by the same hand, and baked at the same time. The loaves were very similar in quality, but that made from the Ohio flour rather had the preference, being whiter, and lighter in texture than the other. No award is recommended, as neither of the specimens is considered superior to the Pennsylvania flour, which obtained a premium last year.

No. 1597, bread, by A. W. Wood, by J. G. Moxey, and by Joseph P. Whiting. All excellent, and creditable to the respective bakers by whom it was made. They all deserve encouragement.

XXXVI.—*Clothing and Needlework.*

In this varied and extensive department there are always many articles which require female taste and judgment, properly to estimate their merits. We have, therefore, in this, as in former exhibitions, both in this branch and that of house-keeping articles, asked and received the aid of a Committee of Ladies of acknowledged skill and taste in the matters referred to them. The industrious and attentive assiduity with which they fulfilled the duty of examining,—and the lucid and able reports which they returned as the result of their deliberations, are honorable to them and merit the thanks of the Institute.

They notice the general display of clothing and needlework as being fully equal to former exhibitions; and while they regret the expenditure of time and skill upon articles of comparatively little usefulness, they feel bound to note with admiration the many successful triumphs of the needle, in the numerous forms to which the labors of their countrywomen have been applied. For such productions as are distinguished by rare excellence, or by marked utility, they have recommended awards;—there are, however, many others which evince great industry and skill in the use of the needle, but which do not claim more than general praise.

No. 945, embroidery, by Mrs. Wickersham. Of elaborate design; evincing much taste and skill in the blending of colors and workmanship. A Second Premium.

No. 983, a lot of clothing, by Bennet & Co. Of handsome pattern and good workmanship;—worthy of a Second Premium.

To each of the following, a Third Premium is awarded:

No. 903, embroidered fire screen, by Miss Mary Dunton. Very beautiful in design and workmanship.

No. 1052, crochet work, by Mrs. C. S. Moore. Superior in richness and design.

No. 1038, fancy clothing and needlework, by A. Brewton. Beautiful specimens.

No. 1021, a rug, by Eliza Thomas: a very good imitation of woven rugs.

No. 915, knit baskets and bonnet, by Mrs. Butler: done with much ingenuity and taste.

No. 914, cotton knit bed spread, by Miss Sarah Reed: of beautiful pattern and neatly executed.

No. 957, Minerva shoulder brace, by Mrs. Boyce,—of improved pattern.

No. 916, shirts and stocks, by C. & E. Henszey: of good pattern and superior work.

No. 963, childrens' clothing, by Mrs. G. Edwards. Workmanship exceedingly beautiful:—patterns the most approved.

No. 1019, boys' clothing, by Wm. B. Taylor: needlework good, and pattern excellent.

Of the following the judges speak in terms of praise, but have not recommended premiums:

No. 1031, fluting, plaiting and goffering, by Madame Juery: very beautifully done,—and premium granted last year.

No. 906, wrappers, shirts, and stocks, by C. A. Walborn: in the accustomed excellent style of this well known manufacturer. The work is well executed,—and the wrappers and badges rich and tasteful.

No. 941, embroidery, by Wilhelmina Schomacker; 964, bonnets, by E. & J. Brown; 1242, needlework, by Miss M. E. Smith; 973, caps and head dresses, by H. G. Suplee; 978, table cover and embroidered tray, by Mrs. A. Schieferdecker; 998, shirts and cravat ties, by G. W. Ward; 1007, caps and head dresses, by Mrs. Dufrene; 1014, head dresses, by Mrs. Mc. Donough; 1027, lace knitting, by Mrs. Catlin; 1043, ladies silk coat, by Mary Edwards. These, with a number of other articles, are commended by the judges for neatness of workmanship, tastefulness of design, and general merit of execution.

Committee on Science and the Arts.

Report on U. S. Government Steamer "Virginia."

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, who, agreeably to request, witnessed, by sub-committee, the experiments tried on the Delaware river with the U. S. Government Steamer "Virginia," Report:—

That they understand that the hull of this vessel was built by Wm. H. Brown of New York, and that her dimensions are as follows:—Length on deck, 147 feet 6 inches; breadth, 24 feet 3 inches; depth, 15 feet 10 inches; tonnage, $403\frac{22}{95}$ tons; draught of water, 7 feet forward, and 7 feet 6 inches aft. She was formerly propelled by two paddle wheels, of Aldrich's patent, similar to the "Hunter submerged wheel," but working vertically. The external diameter of these wheels was nine feet nine inches; each having 16 paddles of 20 by 14 inches. In place of these wheels, the "Virginia" has been recently furnished with two "Loper propellers," worked by the same engines which were used to drive the original paddle wheels. These propellers are each eight feet in diameter. The two engines have each 24 inch cylinders, and 30 inches stroke.

The Committee have no knowledge of the relative speed of this vessel when she was worked by the above mentioned paddle wheels, and are therefore unable to make a comparison between her former and her present performance. They can only state the result of their observations made on an experimental trip with the "Virginia," on the morning of the 11th September, 1847, after the paddle wheels had been removed, and the Loper propellers substituted.

Leaving the wharf, at Dock street, the vessel proceeded down the river, passing the south side of the large ship-house at the Navy Yard at 10 h. 20 m. 47 s., and being opposite the north side of the lower wharf at the Point House at 10 h. 34 m. 47 s.; which makes the time of passing this distance (2·19 miles by coast survey) exactly 14 minutes. Continuing her course, the vessel was opposite the flag-staff at Fort Mifflin at 11 h. 10 m. 50 s., giving a running time, from the Point to the Fort, of 36 m. 3 s.—or, from Navy Yard to Fort, 50 m. 3 s. The distance from the shears at the Navy Yard to Fort Mifflin is, by coast survey, 7·16 miles. During the downward passage, the engines worked very uniformly, making 54 revolutions per minute; it was made against tide, but with a moderate breeze in our favor.

Below the Fort, the experiment was tried of putting the vessel about, by stopping one of the propellers, and also by reversing its action. The first half turn, by which the course of the vessel was reversed, and her head brought so as to be directed up the river, on an exactly opposite course to that pursued immediately before being brought about, was accomplished in 4 m. 30 s., bringing her head round against a stiff breeze from the N. E. The next half turn, by which the head of the vessel was brought to her original course down the river, was

made in exactly two minutes, by the action of the propellers alone. This experiment was repeated, and her head again directed up the river, in 3 m. 2 s.; while the next half turn, to bring her again upon the downward course, occupied 2 m. 14 s.

In returning up the river the tide was favorable, but the passage was made against a stiff breeze from the N. E. From the flag-staff at Fort Mifflin to the Point House wharf, the run was made in 29 m. 17 s., and from the Point House to the Navy Yard in 12 m. 20 s.—total time, from Fort to Navy Yard, 41 m. 30 s.; the engines making 50 revolutions per minute. The Committee had no means of ascertaining exactly, for themselves, the pressure of steam employed; but were informed that it was 60 pounds to the square inch.

By order of the Committee,

WILLIAM HAMILTON, Actuary.

Philadelphia, Nov. 11, 1847.

Report on J. H. Schomacker & Co.'s Pianos.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, to whom was referred for examination an Improvement in Pianos, invented by Messrs. J. H. SCHOMACKER & Co., of Philadelphia, Pennsylvania, REPORT:—

That they have examined the application to pianos of the inventions lately made and patented by J. H. Schomacker & Co., of which the following is a brief description:

The sounding-board, in these pianos, is constructed so as to be detached from the sides of the Instrument, resting on props, or supports, which are secured to the bottom of the case; one end of the sounding-board being made with a return, so that its whole length is virtually increased. This construction frees it entirely from the injuries which it would receive from changes in the form of the case caused by the strain of the strings, or from the usual shrinking and warping of the wood used in construction, and gives it the fullest opportunity to aid in the vibration consequent upon the sounding of the string.

The result of their examination, which has been carefully made, is, that Mr. Schomacker has, by his *detached sounding-board*, attained, in the tone of his pianos, a much greater degree of sonorousness and resonance than the Committee have before observed in other instruments of the kind. They are also of opinion that these pianos will be more durable than those made by the old principle, and that the inventor is deserving of much praise for introducing this improvement, which will doubtless accelerate the perfection which these instruments are gradually attaining.

With regard to the patent arrangement for candle-sticks, on the music-board, the Committee believe that it is a very convenient arrangement—no objections can now be raised as to the danger of their

vibrating, as all the parts of contact are carefully and effectually lined with felting.

By order of the Committee,

WILLIAM HAMILTON, Actuary.

Philadelphia, Nov. 11, 1847.

Report on W. H. Jennison's Diaphragm Filter.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, to whom was referred for examination the Diaphragm Filter submitted by W. H. JENNISON, of the city of New York, REPORT:—

That they have carefully examined and experimented on the three varieties of filters submitted to them. Their experiments have been conducted with great care and have extended over a duration of nearly 20 months.

No. 1. The first filter of Mr. Jennison is in the form of a hollow truncated cone, attached to a similar cone by its base, thus forming a double cone, at each end of which is a female screw adapted to the male screws on the nozzles of our common hydrants; within this is a double cone, attached at the place of junction to the external shell, and leaving a space between them varying in dimensions from a quarter of an inch to an inch. The internal cone is perforated with holes, to allow the passage of water and act as a colander. A conical cap of felt is attached, by its edge, to the ring forming the base of the interior vessel within which it plays loosely, and constitutes the filtering medium. The current of water passing through the upper colander is strained through the felt, leaving the coarser particles of sedimentary matter on its upper surface, and passes through the lower colander and nozzle into any vessel ready to receive it.

No. 2. The second filter contained, in lieu of the inner perforated double cone, two parallel circular plates of perforated metal, attached, at their edges, to the external shell, separated from each other, by a chamber filled with compressed sponge previously reduced to small fragments. The shape of the external shell also, in some specimens, approximated to a spheroid, having nozzles with screws, as in the filter No. 1.

No. 3. The third filter contained sharp pure sand, exceedingly compressed, (in lieu of sponge, as in No. 2,*) and the perforated plates of zinc were covered, on their inner surfaces, with tinned brass gauze wire sieves, of exceeding fineness. The compactness of the sand is further increased by burnishing the external shell. Several varieties of these sand filters were examined by the Committee containing strata of sand varying in fineness of grain.

The mode of using Mr. Jennison's filters is to screw them on to a water pipe; the water, when laid on, passes through the filter under pressure in *very large quantities*, leaving upon it the coarser particles,

* As the sponge and felt are subject to decay, Mr. J. has discontinued the manufacture of filters containing these materials.

until it becomes obstructed, and it is necessary to cleanse it. This is accomplished, not in the usual manner, (viz: that of reversing the current of water, and thus scouring the filtering bed,) but by reversing the filter itself, by unscrewing it, and attaching it, by the opposite female screw, to the nozzle of the pipe. In a few seconds the water, having removed the sediment, again will be delivered pure as before.

The idea of *reversing the current*, for the purpose of cleansing filters is not new, for it has long been employed in Europe, and elsewhere, in closed filters of magnitudes varing from a few inches to several acres area. The plan of reversing filters is, moreover, not new: an old mode of tying a bag of felt-cloth to the nozzles of hydrants, and cleansing by removing it, and causing the water to pass through in an opposite direction, may be considered the same in principle.*

The Committee are of opinion that the filters of Mr. J. marked No. 3, (the sand filter,) *will be useful* in separating the larger particles of mud, vegetable matter, and many of the animalcules, minute eels, &c. from water, but that it is not capable of separating the *very fine* mud which abounds in streams after heavy rains.

During a few weeks of the year, when freshets prevail, the filter will not yield clear water, although it separates the greater portion of the mud, &c. At all other times, it delivers the water clear, and in vast quantities.

The introduction of several metals, such as brass, tinned wire, zinc colanders, soldered joints, &c., as component parts of the filter, must, from their galvanic relations, be productive of injury to the materials of the filter—lessening the durability of the apparatus.

By order of the Committee,

WILLIAM HAMILTON, Actuary.

Philadelphia, Nov. 11, 1847.

Monthly Meeting, November 18, 1847.

The usual stated business was first transacted, embracing the following subjects: the reading and adoption of the minutes of the previous meeting; announcement of donations; Treasurer's statement of receipts and expenditures; reports from standing and special committees; proposal of new members, 134 in number; election of those proposed at last meeting; resignations, &c.

Communications on subjects connected with Science and the Arts being next in order:—

Mr. G. W. Smith presented a specimen of *patent safety fuse*, for blasting under water, believed to have been made by Bacon & Bickford, of Simsbury, Conn. This was placed in a tub of water—each of the two ends projecting a few inches from the surface. One of the

* An old filter, described in the Dictionary of Arts and Manufactures, Paris, 1847, resembles the filter of Mr. Jennison, both in form and mode of operation; it is, however, larger, and the bed of sand is thicker; as the weight is greater, it is suspended on trunnions. The experiments tried by the Committee on larger filters gave much better results with turbid water than the small filters of Mr. Jennison.

ends being ignited, the fuse burned throughout its whole length—that portion of the outer covering which remained under water being unconsumed, but that of the two projecting ends being completely burned. From the successful result of this experiment, it would appear that the article is well adapted to the purpose intended.

Mr. Trego laid before the meeting two fine specimens of *gum copal*, presented for the Cabinet of Arts and Manufactures of the Institute, by Mr. Schrack, of Philadelphia. One of these, of large size, is cut and polished so as to exhibit its beautiful color and transparency, more resembling an enormous topaz than a production of the vegetable kingdom.

Prof. W. R. Johnson presented a specimen of *Cadmia*, from an iron furnace at Housatonicville, near West Stockbridge, Mass. This is a substance frequently found adhering to the inner walls of blast furnaces, about six feet below the tunnel head, or just below the charge of fresh ore, where it forms a ring, which, as it increases in thickness, becomes troublesome, by impeding the descent of the charge. The color of this substance is not always the same, being sometimes yellow, orange, dark green, or nearly black. Its specific gravity is about 5. It is soluble in sulphuric, nitric, hydrochloric, and acetic acids—and, by the application of the proper tests, zinc is found to be its principal metallic constituent. Prof. J. observed that a similar substance is found in the furnaces of Belgium, where it is esteemed a valuable material for combining with copper, in the manufacture of brass. He explained the formation of this deposit by supposing it to be produced by the oxidation of zinc contained in the iron ore, and deposited on the walls of the furnace at a place where it is infusible, thus giving trouble to the manufacturers of iron. He suggests that a thorough roasting of iron ores before putting them into the furnace, will prevent the inconveniences arising from the formation of cadmia.

Mr. Trego remarked that he had frequently observed the formation of this substance in a number of furnaces in Pennsylvania, and he had collected several specimens of it, which, however, were somewhat different in external appearance from that presented by Prof. Johnson; being of a more compact and uniform texture, and of a yellowish, or greenish color. He believed that Prof. J. was correct in attributing the formation of cadmia to zinc contained in iron ores, having often seen, in broken nodules of the argillaceous ores found in the coal formations of this State, distinct and beautiful crystals of the sulphuret of zinc, enclosed in the iron ore.

Prof. Johnson next exhibited two specimens of sediment, or incrustation from the interior of a steam boiler used at Burlington, N. J., for raising water from the Delaware; the boiler being, it is said, supplied with water from the river. One of these specimens is much more dense and solid than the other, which presents a highly porous or cavernous structure. The specific gravity of the solid cake is 1·235; the other is so light as to float upon water, at least for a short time. The color is a dark brown, approaching to black; the consistency that of soft chocolate. It has a faint odor, resembling that of beef tallow, or suet. Heated to a temperature of 230°, the mass becomes softened;

at 260°, may be easily moulded by the fingers, and the odor is perceptibly increased; at 480°, it still retains its consistence, and, on cooling, the color is changed to a lighter brown; at about 900°, it softens, intumesces, and burns with a brilliant flame, giving forth the peculiar odor of burning tallow, or animal oil. The result of continued combustion is a dark grey ash, amounting to 34·88, per cent; showing that 65·12 per cent. of the mass was combustible matter. Being digested in ether, 11·34 per cent. is dissolved; from this, after evaporating the ether, results a yellowish brown substance, of waxy consistence, having an odor approaching that of taurine. The ashes effervesce with acids, and are partly dissolved—the solutions yielding both lime and magnesia; the remainder appearing to be oxide of iron and silicate of alumina. Prof. J. further remarked that a substance like this, might, if highly heated, produce an explosive gas, and remarked upon the danger of allowing oil, or fatty matter, to enter the boiler with the water. In the lighter specimen, it is evident that the cavernous structure is the result of the passage of numerous bubbles of gas, or steam. He accounts for the character of this deposit by supposing it to be a species of soap, formed between the earthy oxides and the acids of animal fat.

MECHANICS, PHYSICS, AND CHEMISTRY.

Economical Process of making Bichromate of Potash, from the Chromates of Lead and the Bichromate of Lime. By M. V. A. Jacquelain.

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

This process was performed, for the first time, in June, 1845, upon a quantity of 10 kilogrammes, at the establishment of M. Guerin, late Professor of Chemistry in the Normal School. Afterwards, in the month of September, of the same year, the experiment was repeated with 50 kilogrammes of chrome ore, near Rouen, by M. Maze, manufacturer of soda, and one of our most skilful operators.

M. Allain, on his part, published, in November, 1846, in the *Revue Scientifique*, a process which resembles mine, so far as regards some of the primary materials; but that which I am now about to set forth differs from the preceding in the details of execution, and in the study of the principal phenomena, a perfect knowledge of which is inseparable from all industrial enterprise.

Explanation of the Process.—1. Mix together, in casks revolving upon their longer axes, chalk and chrome ore, previously reduced to a very minute state of division. This tenuity of the ore may be obtained by pulverization, and then passing it through a very fine sieve; for it is important, above every other consideration, to have an impalpable powder, for reasons which will be presently shown.

2. Calcine this mixture for nine or ten hours at a lively red heat, upon the hearth of a reverberatory furnace, taking care to spread it to

a thickness of five or six centimetres, and to stir it well ten or a dozen times with a rake, or poker.

At the end of this time, if the flame has been sufficiently oxidating, the conversion of the oxide of chrome into chromate of lime will have been accomplished. This may be ascertained, first, by the appearance of the material, which will be of a yellowish green color;* and next, by its having the property of dissolving completely in hydrochloric acid, with the exception of the sandy portion.

3. Having proceeded thus far, the material, now very friable and porous, is next ground fine, and diluted with warm water. The liquid mass is constantly stirred, while sulphuric acid is added until the liquor will slightly redden blue litmus paper. This character is an indication of the total conversion of the chromate of lime into a bichromate, and of the formation of a little sulphate of the sesquioxide of iron.

4. Diluted chalk is then added, little by little, to the liquor, until the sesquioxide of iron is completely eliminated. In this the bichromate of lime undergoes no change as to its condition of saturation.

5. After remaining a short time at rest, the supernatant clear liquor is drawn off—this contains only the bichromate of lime, with a very little sulphate of lime. In this condition it may be immediately used for the production of bichromate of potash, the neutral or basic chromates of lead, and even the chromates of zinc, of which the approaching use may be foreseen, inasmuch as the oxide of zinc has already been so happily substituted for the carbonate of lead in white oil painting.

It will be seen, from the preceding, that it is not necessary to use the bichromate of potash in order to obtain the insoluble chromates of lead, zinc, baryta, &c., and this should bring about a great economy in the preparation of these articles. It is sufficient, therefore, to produce a double decomposition between the bichromate of lime and the acetate, the sub-acetate of lead, the chloruret of zinc, and so on of others.

With regard to the bichromate of potash, it is produced not less easily, nor less pure, by causing a reaction of a solution of carbonate of potash freed from soda, upon the bichromate of lime, from which results an insoluble carbonate of lime, easily washed, and bichromate of potash in solution, which must be concentrated and crystalized under protection from dust, and all access of hydrochloric acid.

Comptes Rendus, Oct. 11, 1847.

On the Influence of Rapid Motion of the Piston upon the Effect of Steam in Engines working expansively: with Experiments upon the subject. By M. PALTRINERI.

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

The researches and numerous experiments which I have made upon the application of motive power to machines, and particularly my ex-

* This singular peculiarity of the chromate of lime with an excess of base, of preserving the green tint of the oxide of chrome, gave rise to the belief, for a long time, that it was not produced by the chromate of lime, and the more so, as this chromate is hardly soluble in water.

periments upon the effect of springs, have convinced me that in the expansion of steam there is a loss of power: a loss which should have a certain relation to the number of superimposed strata of steam which occupy the cylinder, from its bottom to the piston. These strata, moving with the piston, should naturally develope themselves, in order to follow and push it; and it is in this development of strata, one after the other, that the steam must employ a portion of its force, a portion which is certainly lost to the engine. The greater the number of strata, the more rapid is their development; and the more power that is thus absorbed, the less will there remain for useful effect.

Suppose the steam introduced into a cylinder to be intercepted at the moment when the piston has reached a fourth or a third part of its stroke, to give place to the expansion: from this moment we may imagine the fluid mass divided into a determinate number of successive parallel strata, and beginning to develope and expand themselves to drive the piston and follow it. It will then be apparent that the stratum nearest the piston will, without doubt, be able to exert upon it all its effort, and all the rapidity of which it is capable; but it will be also apparent that the one which follows cannot do as much, because the preceding stratum constrains it, by pushing it backwards at the same time that it forces the piston forwards. By its condition as an elastic fluid, steam should naturally expand every way, and maintain at the same time, as is admitted, a uniform density throughout its volume—consequently, the stratum which drives the piston on one side, repels, on the other, at the same time, the stratum which follows it, although allowing itself to be penetrated by it; the latter repels the one which follows it, and so on to the last, which is at the bottom of the cylinder.

There must, therefore, be a collision between one stratum and another, on account of the difference in their velocities, and of the necessary compenetration of one stratum into another, in order that the uniformity of density may be maintained. This collision must evidently produce a loss of power—a loss which should be proportional to the differences of the velocities, and which will be the more considerable according as the number of successive strata is increased, and as the expansion takes place more quickly.

It is from these considerations, confirmed by the results of experiments upon the effect of helical springs, that I am persuaded that a given quantity of steam, working by expansion, will produce more disposable and useful effect acting upon a piston of a large surface and short stroke, than upon a piston of smaller surface and with a stroke proportionably longer, all other circumstances being equal. Desirous of determining the truth of this opinion by rigorous experiment, I caused two steam engines to be constructed under conditions strictly equal, and calculated to produce the same dynamic effect, according to admitted principles. But in one of them, the relation of the surface of the piston to the length of the stroke was in an inverse ratio to that of the other: that is, if one of the pistons had a surface of 20 and a stroke of 24, the other had a surface of 80 and a stroke of 6; so that the volume produced by the movement of one piston is pre-

cisely equal to that of the other. There is, therefore, exactly the same quantity of steam entering and leaving the two cylinders at each stroke of the piston, and, consequently, when the number of strokes is the same, in a given time, in each of the two engines, it ought to be certain that there is the same volume of steam, in the same physical and mechanical conditions, used by each cylinder. These experiments, of which a table is given, were made with all possible precaution, in order that all the conditions of the apparatus should be identically the same; they were repeated several times, on different days, and in the presence of several competent persons. The following table shows the mean of the results obtained in several series of experiments, the apparatus being always kept under the same conditions:—

No. of Experiment.	Kind of Cylinder.	Weight on the Brake.	Revolutions per Minute.	Virtual velocity of end of brake lever.	Pressure on Steam gauge.	Cut-off, or Space for expansion of Steam.	Effect, in kilogr.m's raised 1 metre per second.	Ratio of Effect between the two Engines.
		Kilog's.			Atmosph.			
1	Wide	1·814	150	7·854	$\frac{4}{10}$	Full of steam.	14·247	1·00
	Narrow	1·614	150	7·854	$\frac{4}{10}$	Full of steam.	12·676	·88
2	Wide	1·754	168	8·796	$\frac{9}{20}$	$\frac{3}{4}$	15·428	1·00
	Narrow	1·418	168	8·796	$\frac{9}{20}$	$\frac{3}{4}$	12·472	·80
3	Wide	2·127	174	9·110	$\frac{6}{10}$	$\frac{2}{3}$	19·376	1·00
	Narrow	1·277	174	9 110	$\frac{6}{10}$	$\frac{2}{3}$	11·633	·60
4	Wide	2·116	156	8·168	$\frac{8}{10}$	$\frac{5}{6}$	17·283	1·00
	Narrow	0·916	156	8·168	$\frac{8}{10}$	$\frac{5}{6}$	7·481	·43

The numbers in this table will show, at a glance, the difference of effect between the two engines. Although every precaution was taken to avoid error in the measurements and observations, and though the numbers in the table only show the mean result of several series of experiments, I do not assert that the ratios there given are strictly

those which should result from the physical law of this phenomenon. New experiments, with engines of greater power, and an exact calculation with regard to the results obtained, can alone establish, with the accuracy desirable, all these relations. I believe, however, that the reasoning upon which my opinion is founded, and the results of the experiments which go to confirm it, authorize me to make the following conclusions:—

1. That the velocity of the piston has a much more remarkable influence upon the useful effect of steam than has been heretofore supposed.

2. That this influence is very greatly increased, and according to a certain ratio, on account of the amount of expansion which is allowed to the steam; the greater being the expansion, the greater is the difference of effect.

3. That in order to obtain from steam the greatest amount of useful effect, it is necessary to use cylinders as wide and short as may be practically convenient, and that the piston should move at a very low velocity.

It is certainly not unknown that the effect of steam has a relation to the velocity of the piston; but it has not yet, so far as I know, been recognized that the velocity of the piston has a particular and considerable influence upon the effect of the expansion; and I believe myself to be the first who has directed attention to this subject, and who has sought to demonstrate the truth by experiment. The numbers in the table show, in effect, very considerable differences, although the velocities of the two pistons appear only in the ratio of 1 to 4. The experiments mentioned have manifested two other phenomena which have attracted my attention, and which I recommend to the notice of scientific persons: the first is, that in the engines which I used, and when they were worked by expansion, the pistons were compelled, in some of the experiments, to complete their stroke while having against them (on account of atmospheric pressure) a resistance stronger than the force by which they were impelled. The other phenomenon is relative to the work done by the two engines. In most of the experiments made, the useful effect, as measured by the brake, was always, and even considerably, more than the theoretical effect of the motive power. Does this difference of effect depend upon the partial vacuum created in the escape pipe on account of the rapid passage of the steam, so that the pressure upon the piston has a relatively greater force? May this rarefaction in the escape pipe also account for the continuance in the stroke of the pistons, although they may have been placed in equilibrium by atmospheric pressure before making a half, or two-thirds, of their stroke?

All these questions, the importance of which will be readily perceived by men of science, have need of study and elucidation by experiments, perhaps of a different kind. On my own part, I shall do all that I can; but I call for the aid of learned persons who are conversant with such matters. Comptes Rendus, Sept. 27, 1847.

Note, in support of the Opinion advanced by M. Joule, upon the Identity of Motion and of Caloric. By M. SEGUIN, Senior.

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

In a work which I published in 1839, upon the influence of railroads, I advanced the opinion that steam was only the medium which is used for the production of force, and that reciprocally; and that there must exist, between caloric and motion, an identity of nature in such manner that these two phenomena are but the manifestation, under a different form, of the effects of a single and the same cause.

These ideas were communicated to me, long ago, by my uncle, Montgolfier; and I only waited, before giving them publicity, until positive experiments and well-established facts should give them the sanction of demonstration.

Under these circumstances I learned, by the *Compte Rendu* of the session of 23rd June last, of the experiments made by M. Joule: and found that the results which he had obtained gave so much force to the opinion of the celebrated man who had advanced the same idea more than fifty years since, that I thought it my duty to submit to the Academy the important consequences which, it seems to me, may result therefrom.

In his article, M. Joule considers caloric as free from bodies, and demonstrates that the heat required to increase the temperature of one gramme of water, one degree of the thermometer, is equal to a mechanical force capable of raising a weight of 430 grammes, one metre in height.

Now, in regarding this question under a point of view altogether different from that of M. Joule, I have arrived at an almost identical result. Having supposed, in effect, that the decrease of temperature resulting from the expansion of a gas which extends itself throughout a space larger than that which it previously occupied, represented the mechanical force which then appeared; I calculated the number of kilogrammes of water that a cubic metre of steam, at 180 degrees, (Centigrade) could, by its expansion, elevate one metre in height, according as its temperature decreased—and calculating the products for every 20 degrees, up to 80. In reducing my results to the type of one gramme raised one metre in height, adopted by M. Joule, and correcting them as regards the ratio of the specific heat of water to that of steam, I found that the amount of mechanical power developed by a gramme of water, raised one degree in temperature, was as follows:—

Between	180°	and	160°	= 395 gr.		
"	160	"	140	= 412 "		
"	140	"	120	= 440 "	}	Mean, 449 grammes.
"	120	"	100	= 472 "		
"	100	"	80	= 529 "		

These results oscillate, as will be perceived, about the number 430, which was arrived at by M. Joule; and this notwithstanding, as I

have said, that we are placed in an altogether different point of view. M. Joule has considered the caloric as free, and the pure and simple elevation of the temperature of water a certain number of degrees, in a thermometrical scale circumscribed between two or three degrees; while I have regarded the caloric as latent, or the variation of temperature which steam undergoes in passing from one state of pressure to another, and that within the most extended limits, inasmuch as they vary between 80 and 180 degrees, in which it is hardly possible to be certain that the thermometric scale, used to measure the temperature, really represents the quantities of caloric which it indicates. And it is from this, perhaps, that arise the differences of mechanical power developed by steam, between the two extremes of the scale of results which I have obtained—results which would have presented themselves in a very different manner, and even, perhaps, in an inverted sense, if, instead of mercury, a thermometer constructed of any other substance had been used—the expansion of bodies, according to the variation of their temperature, being, possibly, a property which is not subject to the same law as that of the amount of mechanical power which they then develope.

If, in conjunction with these facts, we consider a great number of others in which caloric is known to be produced by motion, such as percussion, compression, friction, change of condition, or of nature, we shall be convinced that the two phenomena, identical in themselves, are but the consequences of a general law which governs the movement of all bodies; and that the phenomena which we designate under the title of *caloric*, are nothing but the effects of the communication of motion of bodies among themselves, when they are reduced to a state of division of which we cannot appreciate the intensity, or the circumstances, as we are able to do when these same bodies have, in mass, a movement which may be measured by the sensible effects which it produces.

I shall not undertake to enumerate all the consequences which would result from the adoption of this principle, and chiefly the modifications which it would produce in the application of steam to the production of power.

In steam engines of medium pressure, which are those presenting the most advantages, the steam is used between the limits of pressure which I consider equal, approximatively, to a reduction of 80 degrees of temperature, after which the elasticity of the steam is destroyed by condensing it, or it is allowed to escape into the air. But it is evident that, in this state, the steam still contains 630 degrees of heat which is not made useful, and that we might, by continually using the same steam, and restoring to it at each stroke of the piston the quantity of heat which has been lost in the act of producing the motion, obtain results which would bring about a complete and immense revolution in this department of mechanics which has become so interesting at the point of civilization to which we have now arrived.

With the view of explaining facts which, at the first glance, appear so little to be derived from the same source, and of which it will be so important to give an explanation showing that they class them-

selves naturally under the law of universal gravitation, I have undertaken a work which I propose to submit to the Academy so soon as it may be in a sufficient state of forwardness to merit serious attention from them.

Comptes Rendus, Sept. 20, 1847.

On the Anomalous Specific Heat of certain Alloys, and their spontaneous Increase of Temperature after Solidification. *By* M. C. C. Person.

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

M. Regnault has discovered, in alloys fusible at about 212° F., a specific heat much greater than the mean of the metals composing them, and proposes to examine whether this anomaly does not disappear at lower temperatures. The experiments reported in my memoir show that it does, in effect, disappear. Thus, in the alloy of d'Arcet,* I have $c = 0{\cdot}069$ from 201·2°, and $c = 0{\cdot}037$ from 122°; as the calculated mean is 0·036, it will be perceived that the difference is very trifling. The principal difficulty in these researches was to heat the alloys to exact temperatures below 212 degrees; for this purpose I used a stove of simple construction, of which a drawing is annexed to the memoir.

This point being explained, I make it appear that the excess of heat observed in this alloy, near its melting point, is not owing to the commencement of fusion, as might be imagined, but to a new kind of latent heat of which the following experiment shows the evolution. A glass bulb, filled with the alloy in question, is isolated in such manner that the cooling may be observed; and for that purpose there is fixed in the alloy a thermometer, of which the changes may be noted with an eye-glass and stop-watch. Suppose the glass vessel to contain 150 grammes of the alloy of d'Arcet, the thermometer, which, at about 266 degrees, takes five or six seconds to fall two degrees when the alloy is in a liquid state, takes more than 400 seconds to fall 3·6° degrees between 204·8° and 201·2°. This is very simple: the latent heat of fusion is being disengaged during this interval. The solidification being completed, the thermometer resumes a regular rate, falling one degree in five or six seconds, until about 134·6 degrees, where it suddenly stops, and even rises two or three degrees. At the same time, the glass bulb is broken by a considerable expansion of the whole mass, and this expansion continues after the cooling, so that the thermometer, which was before strongly pressed, becomes free and movable. There is, therefore, in this, a change of constitution in the alloy, and the heat which was disengaged during this modification was sufficient to sustain the thermometer between 136·4 and 132·8 degrees for more than 400 seconds; but it then immediately fell one degree in five or six seconds. The disengagement of heat afterwards

* This alloy is composed of bismuth, 8; lead, 5; and tin, 3. It is known as "Newton's Fusible Metal," and melts at a temperature below that of boiling water.—Com. Pub.

continues for a long time, of which we have proof by the extraordinary slowness of the cooling.

In order to measure the heat, I employed a process which was used by Rudberg on another occasion; but I availed myself of a means of verification which, I hope, will remove the uncertainty for which he was reproached by M. Despretz. I observed, comparatively, with a chronograph, the cooling of the alloy and that of another body as identical as possible, and placed in the same circumstances. The heat lost by this body at each degree being known, I had, approximatively, that lost by the alloy; but, moreover, I measured, with a calorimeter, the heat lost by the alloy between certain temperatures—the measure by cooling must necessarily have shown the same figures. I therefore had, as has been said, a means of verification and correction. The tabular statement of cooling, thus corrected, gives the heat lost by the alloy at each instant; the changes which take place in its specific heat are also shown, and the latent heat of fusion is also measured, as well as that which results from change of constitution—this last is about three calorific units per gramme, for the alloy of d'Arcet. There is another mode of measuring it which is less exact, but which leads to a curious result. After having melted the alloy, I allowed it to become solid, and then to cool down only, for example, to 201·2 degrees, in order that the heat of decomposition should not be disengaged. Then passing it into a calorimeter, it gave 7·4 cal.—but on reheating again to 203 degrees, I could only obtain 5·2 cal.; so that I arrived at this paradoxical result: that the same body contains least heat when it is the hottest. The difference, 2·2 cal., arises from the fact that the alloy, in reheating to 203 degrees, has only in part suffered a change of constitution.

If, after having melted the alloy, it be suddenly cooled by plunging it into water, and then withdrawn as soon as it may be safely handled, it will, in a few moments, become again so warm as to burn the fingers. Here, the sudden cooling is at first opposed to the change of constitution; but a moment arrives at which the disposition of the molecules ceases to be compatible with so low a temperature, and then the new arrangement takes place. And, on account of having been thus retarded, it recurs with much more energy, that is, in a much shorter time—it is not only a slower cooling which is observed, but a reheating which may carry the mass to 158 degrees.

To recapitulate: the excess of caloric given out by alloys when heated nearly to their melting point, does not proceed from the latent heat of fusion; nor should it be considered as being simply specific heat—it is heat due in a great measure to change of constitution, which may take place in an alloy completely solidified and considerably below its melting point. Comptes Rendus, Sept. 27, 1847.

Artificial Minerals.

The experiments of M. Ebelmen, to produce minerals artificially, communicated to the Academy of Sciences, Paris, are thus given in

L'Institut: the immediate subject being chiefly the varieties of the ruby:

"The method I adopted to crystalize these compounds, depended upon the property of boracic acid to dissolve all the metallic oxides, and upon the great volatility of this acid at a high temperature. I thought that by dissolving, in melted boracic acid, alumina and magnesia, mixed in the proportions that constitute the spinel, and by exposing this borate in open vessels to the high temperature of the porcelain kiln, the affinity of alumina for magnesia would determine the separation of a crystalized aluminate, and the complete expulsion of the boracic acid. In short, I employed boracic acid at a high temperature, as water is used at ordinary temperatures, to obtain crystalized salts by evaporation alone. The proportions were about one part of melted boracic acid to two parts of alumina and magnesia, mixed synthetically to constitute the compound, $Al^2\ O^3\ MgO$; with the addition of a small quantity of the bi-chromate of potash. These materials, well mixed, were put on a platinum leaf, in a biscuit-cup, and exposed to the heat of a porcelain biscuit-kiln. I obtained a surface covered with crystaline facets, presenting in their interior reticulated cavities, the form of which was easily distinguished with the lens. These crystals were rose-colored, transparent, readily scratching quartz, and presenting the form of regular octohedrons, without any modification. They are quite infusible in the blow-pipe. These characters, joined to the composition of the crystals, synthetically ascertained, appear sufficiently conclusive to establish their identity with the spinel.

"By substituting for the magnesia its equivalent of the protoxide of manganese, a crystalized product is obtained in large laminæ, in the form of equilateral triangles, or of regular hexagons. These crystals, also, readily scratch quartz. I consider them to be the manganesiferous spinel $Al^2\ O^3\ MnO$, which has not yet been met with in the mineral kingdom.

"Oxide of cobalt, substituted for the magnesia, equivalent for equivalent, gave bluish black crystals, regular octohedrons. They, again, scratch quartz, but with more difficulty than the preceding."

In employing alumina and glucine in the proportions that constitute cymophane or chrysoberyl, $Al^2\ O^3\ GlO$, a bristling mass of crystaline asperities of great brilliancy is obtained. This product readily cuts quartz, and very cleanly topaz. It presents then a hardness comparable to the crystalized cymophane.

Certain silicates, infusible at the temperature of our furnaces, appear capable of being reproduced by the same process. Thus, in melting the elements of the emerald with half their weight of boracic acid, at the same temperature as in the preceding experiments, a substance is obtained, which easily scratches quartz, and the surface of which presents a great number of facets having the form of regular hexagons.

"I content myself," M. Ebelmen adds, in conclusion, "with submitting to-day these first indications, hoping, however, soon to present to the Academy a more detailed and more complete work. But I am convinced, at present, that it is possible to produce, at tempera-

tures below those of our iron smelting furnaces, diaphanous crystals, the hardness and external characters of which are analogous to those of precious stones. It is probable that in repeating these experiments in apparatus of certain dimensions, like reverberating furnaces, by operating on large quantities of materials, and continuing the application of heat sufficiently long, much larger crystals may be produced than those I have obtained, working with a few grammes only. Another conclusion to be drawn from the preceding facts is, that many species of minerals have the power to produce themselves and crystalize at temperatures much below those necessary to melt them."

Specimens of the products mentioned in the communication were submitted to the Academy. Civ. Eng. & Arch. Jour.

Test for Distinguishing Iron from Steel.

To distinguish iron from steel by a chemical process, take pure nitric acid, dilute it with so much water that it will only feebly act upon the blade of a common table knife. If a drop of the acid thus diluted be suffered to fall upon steel, and allowed to remain upon it for a few minutes, and then washed off with water, it will leave behind a black spot. But if a drop of this acid be suffered to act upon iron in the same manner, the spot will not be black, but of a whitish-grey color. The black stain is owing to the conversion of the carbon of the steel into charcoal, which thus becomes predominant; and iron being nearly free from carbon, can produce only a grey stain. The utility of this test is not confined to finished articles manufactured of steel, but its application enables the workman in iron and steel to ascertain also the quantity and uniformity of texture of unfinished articles.

Ibid.

Improvements in Glass Chimneys for Gas-Lights, Lamps, &c.

Achromatized Light.—The unpleasant and, to many sights, painful effects of the naked flame of a candle, lamp, or gas-burner, have long been known and felt, as also that they are not by any means lessened by passing through colorless glass; and numerous experiments, and much research, have been followed up by scientific men, with the view of discovering means of improving the color of artificial light generally. The cause of the yellow glare perceptible during the combustion of all the hydro-carbons, is owing to the radiation of a superabundance of the red and yellow rays of the spectrum, and it is owing to the effect of these on the retina, that certain colors cannot be distinguished from others, when seen by artificial light. The principle has long been known to opticians, and in 1790, Dollond, of St. Paul's Churchyard, after many years of study and experiment, introduced the achromatic lens for telescopes, by which the iridescent halo, which obstructs and pains the sight in common glasses, is removed, or prevented, and the object is seen through a perfectly clear and colorless fluid-like medium. Mr. McNeill, of St. Martin's-lane, has introduced

a glass chimney, which does for common artificial light what Dollond effected for the telescope. He has patented a glass chimney, colored, in its melted state, with a natural or slightly blue tint, which, when in use, obstructs the passage of the red and yellow rays, and leaves the flame of a mellow wax-like white, so imitative of daylight, that the various colors of the most delicate hues, such as ribands, silks, shawls, &c., can be most perfectly distinguished; and we understand, that more than one of our most eminent artists, who had entirely discontinued painting by gas or lamp-light, have, on obtaining the achromatic chimneys and globes, again taken to it; as they are as able to distinguish the most delicate contrast of color as by daylight. Achromatized light is, from its extreme purity, perfectly unirritating to the eye—a sensation of coolness and relief being produced, in place of the pain and fatigue caused by the hot glare of uncorrected light. The quality which it possesses, of enabling the eye to indicate with distinctness the smallest characters of type, or manuscript, renders it unrivalled for the purposes of study, reading, long-continued exercise of the pen, as in public and private offices, banks, counting-houses, clubs, literary institutions, &c.; in short, under all circumstances, and in all situations, a universal means of improved illumination.

Lond. Min. Jour.

On the Detection of Cotton in Linen. By M. Kindt.

The ingenuity which competition in our textile manufactures continually elicits is now too frequently directed to the production of a deceptive and fugitive appearance in goods, instead of the real improvement of the fabric. It is therefore desirable that the consumer, who is well pleased with the reduced cost of his goods, should be able to ascertain where the economy has been effected; or, in other words, what kind of fabric he has purchased. With the view of assisting him in this analysis, we gave, in Vol. XXX., a test, by M. Vincent, for ascertaining the presence of New Zealand flax in sail or other cloth; and, as a carrying out of the same idea, we now insert the experiments of M. Kindt (for which we are indebted to the Philosophical Journal), whereby the presence of cotton may be detected when combined with flax; and perhaps, at the present time, such a test may be the more required, as a recent invention for polishing thread, has enabled the manufacturer to produce that article, with very inferior materials, superior in gloss and apparent firmness to thread made of the best flax.

"This subject has frequently engaged the attention of commercial and scientific men; many experiments have been made, in order to detect cotton thread in linen; many processes have been recommended, but none have hitherto proved satisfactory. I was therefore much surprised when a stranger, a few weeks ago, showed me a sample of linen, from the one-half of which all the cotton filaments had been eaten away. He had obtained it in Hamburg, and asked me whether I could give him a process for effecting this purpose. Now since, as

far as I am aware, nothing has been published on this subject, and it is of very general interest, I consider it a duty to communicate the results of my experiments. I had already observed, in experimenting with explosive cotton, flax, &c., that these two substances behave somewhat differently towards concentrated acids; and although it has long been known that strong sulphuric acid converts all vegetable fibre into gum, and when the action is continued for a longer period, into sugar, I found that cotton was metamorphosed much more rapidly by the sulphuric acid than flax. It is, therefore, by means of *concentrated sulphuric acid* that cotton may be removed from linen when mixed with it; and this object may be obtained by the following process:—

"The sample to be examined must be freed, as perfectly as possible, from all dressing, by repeated washing with hot rain or river-water, boiling for some length of time, and subsequent rinsing in the same water; and I may expressly observe, that its entire removal is requisite for the experiment to succeed. When it has been well dried, the sample is dipped for about half its length into common oil of vitriol, and kept there for about half a minute or two minutes, according to the strength of the tissue. The immersed portion is seen to become transparent. It is now placed in water, which dissolves out the gummy mass produced from the cotton: this solution may be expedited by a gentle rubbing with the fingers; but since it is not easy to remove the whole of the acid by repeated washing in fresh water, it is advisable to immerse the sample, for a few instants, in spirits of hartshorn (purified potash or soda have just the same effect), and then to wash it again with water. After it has been freed from the greater portion of the moisture, by gentle pressure between blotting-paper, it is dried. If it contained cotton, the cotton threads are found to be wanting in that portion which had been immersed in the acid; and by counting the threads of the two portions of the sample, its quantity may be very readily estimated.

"If the sample has been allowed to remain too long in sulphuric acid, the linen threads likewise become brittle, or even eaten away; if it were not left a sufficient time in it, only a portion of the cotton threads have been removed: to make this sample useful it must be washed, dried, and the immersion in the acid repeated. When the tissue, under examination, consists of pure linen, the portion immersed in the acid likewise becomes transparent, but more slowly, and in a uniform manner: whereas, in the mixed textures, the cotton threads are already perfectly transparent, while the linen threads still continue white and opaque. The sulphuric acid acts upon the flax threads of pure linen, and the sample is even somewhat transparent, after drying, as far as the acid acted upon it; but all the threads in the sample can be seen in their whole course.

"Cotton stuffs, containing no linen, dissolve quickly and entirely in the acid; or. if left but one instant in it, become so brittle and gummy, that no one will fail to recognise it as cotton, when treated in the above manner."

Lond. Journ. of Arts & Sci.

M. Ledoyen's Disinfecting Fluid.

The English journals have been busy of late in discussing the relative and absolute merits of chloride of zinc and nitrate of lead, as antiseptic and disinfecting agents. It appears that in the year 1840, Sir William Burnett, Director General of the Medical Department of the British Navy, took out a patent for preserving animal and vegetable substances by means of chloride of zinc, and its application was directed entirely to the prevention and suspension of decay. Since then the patentee has brought his liquid before the public as a disinfectant applicable to destroy deleterious and offensive effluvia, such as those of a contagious character in fever hospitals, etc.

More recently, a preparation called "Ledoyen's disinfecting fluid," has been brought into notice, which is represented to "possess the property of destroying the offensive effluvia of cesspools, drains, sick rooms, &c., and preventing the spread of contagious diseases. It was the design of M. Ledoyen to submit the merits of his "fluid" to a committee of Parliament, that if substantiated he might receive a reward from government, for divulging the composition of his preparation. He refused, meanwhile, to place the disinfectant in the hands of any party who did not obligate himself not to examine it; but the editor of the Pharmaceutical Journal having obtained possession of a specimen, without this condition, he states it to be a solution of nitrate of lead, which has since been acknowledged by the parties.

The antiseptic power of chloride of zinc, has been too fully established in the dissecting rooms of this city to need comment—but in reference to the more important power of a disinfectant that has been attributed to it, there is much doubt. The disinfecting action of both the substances is founded on the premises, that hydrosulphuric acid is the cause of contagion and fœtor, in the miasm and exhalations from decomposing animal matter, the truth of which is by no means perfectly established, else, as Mr. Bell observes, why do not the occupants of our laboratories become diseased through its influence. Admitting that sulphuretted hydrogen is the noxious agent to a certain extent, the question arises, are these salts efficient in decomposing and neutralising its effects?

Chloride of Zinc.	*Nitrate of Lead.*
If neutral chloride of zinc be treated with sulphuretted hydrogen, but a small part of the salt, will undergo decomposition forming sulphuret of zinc and hydrochloric acid.	If nitrate of lead be treated with hydrosulphuric acid, sulphuret of lead will be formed and nitric acid and water be set free.
The presence of free acid in solutions of zinc salts, prevents their decomposition by the gas, and hence the disinfecting action of the solution is destroyed.	As the salts of lead are decomposed by the gas in question, in the presence of free acid, the disinfecting action will not cease till all the salt has been decomposed.

The conclusion arrived at is that chloride of zinc has very decided powers as an antiseptic—whilst nitrate of lead is far more efficient as a destroyer of noxious effluvia containing sulphur.

In reference to Ledoyen's solution, the discoverers speak of its powers in the following terms:

1st. "It disinfects night soil, not destroying but increasing vegetation, more particularly as regards agriculture; *completely preventing the disease in potatoes,* when the land is manured with disinfected night soil.

2d. "It disinfects hospital wards of miasma, also cellars, water closets, and buildings infected by impure gases.

3d. "It disinfects sailors suffering from fever on board vessels; it will also disinfect ships at sea, and under quarantine.

4th. "It disinfects patients suffering with infectious disorders and wounds; also dead bodies, so that they may be kept nearly a month; also different parts of the body can be kept for the purpose of dissection, for coroner's inquests, &c.

Finally. "This process is most effectual as a sanatory remedy for towns, &c."

It may readily be conceived that a preparation promising such immense advantages to mankind, would attract the attention of government and the public. Accordingly, Lord Morpeth, as Commissioner of Her Majesty's Woods and Forests, submitted the "fluid" to the deliberate examination of Dr. Southwood Smith, Mr. Toynbee, and Mr. Grainger, in connexion with the discoverers, whose report was extended over many pages; but of which the following are the conclusions:

"1. That this fluid does not possess any peculiar power in preserving the dead body from decomposition, and that, therefore, it is not applicable to any considerable extent to purposes of dissection.

"2. That it removes the fœtor of putrifying substances, vegetable and animal, by decomposing the sulphuretted hydrogen upon which that fœtor chiefly depends.

"3. That it is capable of preventing the disengagement of sulphuretted hydrogen in sick chambers, and in the wards of hospitals, and of removing it in a few minutes, when it is present, not merely by dissipating the smell, but by destroying the poison.

"4. That the use of it is simple and easy, and as the occasions on which it is required are of constant occurrence, and as it has the peculiar advantage of being itself inodorous, its possession would be a comfort and blessing to private families.

"5. That by decomposing the sulphuretted hydrogen, it removes from night-soil the poison which renders such matters injurious to health and dangerous to life, and by changing the ammonia from a volatile into a fixed substance, and thereby preventing its escape and loss, it preserves in the night-soil the principle which renders it chiefly valuable as a manure, while it presents that principle to the plant in a form which is known to be highly beneficial to vegetation.

"6. That, as it renders the removal of night-soil practicable without creating a nuisance, it ought, in our opinion, to be made a matter

of police regulation, that no privy or cesspool should be emptied without the previous use of a sufficient quantity of it to destroy all offensive smell."

The reporters have evidently avoided the chief question at issue, and directed their answers merely to the action of the fluid on sulphuretted hydrogen, without noticing other deleterious gaseous exhalations or referring to the powers of the liquid in disinfecting miasmatic and contagious atmospheres. The following exposition of the case was submitted to the referees by Dr. Leeson of St. Thomas's Hospital, and is so clear in reference to the objects proposed to be accomplished by the discoverers, that it is introduced here without abridgement:

"The decomposition of animal and vegetable substances gives rise, as it is well known, to septic or infectious miasmata. Those arising from vegetable putrescence, generating disease and fevers of a remittent type, whilst those arising from animal matter are distinguished by a typhoid character.

"Such miasmata, although so dangerous, are not, it is believed, to be distinguished by the smell, and are most probably composed of vegetable and animal organizations so minute and subtle, as to elude the cognizance of those methods and instruments of investigation which have hitherto been employed.

"The fœtid and offensive gases or vapors consist of combinations of hydrogen with sulphur, phosphorus, nitrogen, and carbon.

"The most offensive compounds are those of hydrogen with sulphur and phosphorus, forming sulphuretted hydrogen (or, as it is otherwise termed, hydro-sulphuric acid) and phosphuretted hydrogen gases.

"The ammonia resulting from the combination of hydrogen and nitrogen, although odorous, can scarcely be termed an offensive compound, but being commonly combined with sulphuretted hydrogen, it then furnishes a highly offensive substance.

"The compounds of carbon and nitrogen forming cyanogen; of cyanogen and sulphur forming sulpho-cyanogen, and of carbon and hydrogen forming light carburetted hydrogen, may be reckoned amongst the less offensive, although volatile ingredients of the putrefactive vapors, but which combine to complete the farrago of unpleasant odors.

"The compounds of carbon with oxygen forming carbonic oxide and carbonic acid, although fatal to animal existence when too largely respired, can scarcely be considered as offensive compounds.

"To recapitulate: we may divide and distinguish the elements of animal and vegetable putrescent vapors thus:

Dangerous, but inodorous.	*Odorous, but slightly offensive.*	*Most offensive.*
Remittent miasmata,	Ammonia,	Sulphuretted hydrogen,
Typhoid miasmata,	Carburetted hydrogen,	Phosphuretted hydrogen,
Carbonic oxide,	Cyanogen,	Hydro-sulphate of ammonia.
Carbonic acid.	Sulpho-cyanogen.	

"Two methods naturally suggest themselves to the chemist by

which such dangerous and offensive compounds may be destroyed or prevented.

"First. To alter or otherwise form their component elements into new elements, which are neither dangerous, fœtid, nor offensive.

"Secondly. To fix certain of the elements so as to render the substances themselves no longer volatile, and consequently neither odorous nor offensive.

"First Method. The principal re-agent heretofore made use of in the destruction of animal and vegetable miasmata and for the decomposition of the offensive compounds of hydrogen with phosphorus, sulphur, &c., is chlorine, the efficiency of which is dependent on its great affinity for hydrogen, with which it forms hydro-chloric, or, as it is commonly termed, muriatic acid. Unfortunately chlorine is itself an offensive, irritating, and corrosive substance, which will account for its not having been more extensively employed, although the cheap combination of chlorine and lime is applicable as a disinfecting agent, and might, it is believed, be advantageously employed.

"Second Method, by Fixation. This method is chiefly applicable to the sulphuretted hydrogen, which may, as is well known, be decomposed by a great number of metallic salts. These salts consist of an acid in combination with the oxide of a metal. When sulphuretted hydrogen is passed through or added to a solution of one of the salts alluded to, its sulphur combines with the metal, forming an insoluble inodorous metallic sulphuret.

"The hydrogen combines with the oxygen of the metallic oxide, forming water, and the acid of the metallic salt is set free.

"With regard to the particular process of M. Ledoyen, the experiments conducted by that gentleman at St. Thomas's Hospital led to the conclusion that his process was founded on the second method before alluded to: namely, that of the fixation of the sulphuretted hydrogen by a metallic salt, and that the actual metallic salt employed was ——.*

"This opinion has been frequently verified by M. Ledoyen himself, who, in the most candid manner, not only admitted the composition of his fluid to be such as is here stated, but also delivered a bottle of it to Dr. Leeson for analysis and further experiment.

"In regard to its efficacy as a disinfecting agent, the general result of these experiments establish the conclusion that the efficacy of this process is confined to the removal of the unpleasant odors due to sulphuretted hydrogen and hydro-sulphate of ammonia. As the sulphuretted hydrogen is the most abundant and most offensive of the various products of animal and vegetable decomposition, it is evident that although this process cannot remove the whole of the offensive odors, it is still well suited to effect a very important and extensive amelioration of the nuisance arising therefrom.

"In regard to the application of this liquid as a dressing to putrescent sores, there can be no doubt that it will be found useful, and that it possesses several advantages over those in common use; among others, that it is itself inodorous, that it corrects the fœtid exhalations arising from sores, and that it eliminates one of the most excellent applications to gangrenous sores yet known.

* This omission occurs in the Report, as here printed.

"In regard to the last and most important application of the disinfecting fluid to the removal of the fœtid and most offensive odors arising from privies, cesspools, night-soil, &c., it will appear from what has been already stated, that so far as the offensive effluvia result from sulphuretted hydrogen and hydro-sulphate of ammonia, this liquid will totally remove them.

"The odor resulting from phosphuretted hydrogen, and from the other less offensive compounds, will still remain; but as these odors are neither so offensive nor so readily diffused to a distance as the sulphuretted hydrogen, a most important and beneficial improvement will be effected, particularly in the process of removal.

"It remains to consider what benefits or injuries may result from the employment of this liquid in respect to the subsequent use of the night-soil as manure.

"Two important advantages will no doubt be attained; the one, the conversion of a prejudicial and poisonous ammoniacal salt: viz., the hydro-sulphate of ammonia, into an inodorous and highly fertilizing compound: viz., the nitrate of ammonia. The other advantage is, that by removing that poisonous and injurious compound, thereby saving the long and offensive exposure of the night-soil to the air, which would be otherwise necessary, and which is not only disagreeable, but, by the consequent loss resulting from the volatility of the ammoniacal salts, it is also injurious.

"On the other hand, there is one problematical objection to the extensive applications of this fluid as a manure to land: namely, that the small quantity of the metal employed may possibly, by its accumulation, be productive of ultimate mischief; but this requires further investigation and experiment.

"The above suggestions are made without any desire to detract from the merit due to Messrs. Ledoyen and Calvert, in having thus directed public attention to the use of chemical re-agents as a means of removing a very serious and dangerous impediment to the sanatory condition of towns."

The above facts and statements are chiefly derived from the editorial discussion of the subject, in the August and September numbers of the Pharmaceutical Journal.

It has recently been stated in our daily papers that the frigate Raritan, which had been abandoned at anchorage in Chesapeake Bay, owing to the contagious miasm that infected her hulk since returning from the tropics, was entirely disinfected by the application of some disinfecting agent, the name of which was not mentioned. May it not be one of the salts in question, most probably the nitrate of lead?

Am. Jour. of Pharmacy.

General Rules for the Quantitative Analysis of Soils. *By* ISAIAH DECK, F. G. S., &c., *Analytical Chemist, Leamington.*

Let the soil be well dried in a warm place for four or five days, sift it through a coarse sieve, and weigh out 500 grains, which is the most

convenient quantity to examine, taking care that all results are divided by five to reduce it to the per centage. Heat these 500 grains from about 240° to 230° for half an hour in an oil-bath, stirring occasionally; weigh: the loss is moisture. Heat the remainder to low redness in a crucible for about half an hour, so as to burn it well; weigh when cold: the loss is organic matter. Boil in a large flask for eight hours with 8 oz. of pure muriatic acid and 2 oz. of water, constantly adding when boiled away till about 6 oz. are left: filter while hot on a weighed filter; wash well with distilled water until the washings cease to be acid and dry; ignite and weigh the residue, which is almost pure silica, or sand, with silicate of alumina.

The solution contains oxide of iron, manganese, alumina, lime, phosphoric acid, magnesia, &c.

Saturate this solution with ammonia, which precipitates alumina, oxide of iron, and phosphate of lime; keep the bottle stopped to prevent the conversion of lime into carbonate; pour off clear, and add distilled water; shake up well, keeping the bottle well stopped, and again pour off, and wash again; filter on a weighed filter covered over, and wash well; add all the washings to the solution, and dry to about the firmness of butter; remove with a spatula, and digest with heat in solution of potash for an hour: this dissolves the alumina, leaving the phosphate of lime and oxide of iron; filter while hot on the same filter which retains the phosphate of lime and oxide of iron; wash well, and add the washings to the solution of alumina in potash; saturate this with muriatic acid to redissolve the alumina at first precipitated; then add excess of ammonia: this precipitates the whole of the alumina, which filter, wash, dry, ignite, and weigh.

The oxide of iron and phosphate of lime on the filter can either be well dried and weighed in conjunction, or separated with alcohol; diluted with two parts water, and acidulated with forty drops of sulphuric acid to the ounce; this must be poured warm into the filter and back again two or three times: it dissolves the oxide of iron, and leaves sulphate of lime, into which it has converted the phosphate; dry this, ignite, and weigh: five parts correspond to four of the phosphate.

The iron in solution in the alcohol can be precipitated with ammonia; filter it, wash well, ignite, and weigh.

The solution still contains the manganese, if present, and the lime, which existed in the soil as carbonate, and the magnesia. To separate lime, add solution of oxalate of ammonia (taking care that the liquid is alkaline, as oxalate of lime is soluble in acids), boil for a few minutes, and set aside in a warm place for four or six hours; filter, wash, dry, ignite, and weigh: pure carbonate of lime remains. The magnesia is separated by adding a solution of caustic soda, washing, drying, igniting, and weighing: pure magnesia remains. The manganese is to be precipitated by adding a solution of hydro-sulphate of ammonia, which gives a flesh-colored precipitate; dark brown, if iron is present in conjunction; well wash the precipitate, and pass muriatic acid through, and add carbonate of potash to the solution; filter, dry, ignite, and weigh. 100 grains = 93 of protoxide of manganese.

For determining the amount of sulphate of lime which may yet exist, boil three hundred grains of the soil with one pint of water, with about 80 or 90 grains of sal ammoniac; filter, and evaporate down to 2 oz., and add 1 oz. of alcohol; the sulphate of lime directly falls, and may be collected on a filter, dried, and weighed.

To determine the quantity of chlorides of potash and soda, boil 300 grains with 10 oz. of water for two hours: filter and wash well, and precipitate the chlorine with nitrate of silver; wash, dry, ignite, and weigh. 50 grains are equal to 22 of the mixed chlorides of potash and soda. Farm. Mag.

American Telescopes.

The recent erection of numerous Observatories in this country, furnished with instruments of the largest class, is a subject of congratulation with every friend of astronomy. The Observatory at Cambridge has been provided with a refracting telescope of *twenty-three* feet focal length, and fifteen inches aperture, at a cost of eighteen thousand dollars, exclusive of the duties which amount to thirty per cent. This instrument is of the same dimensions as that of Pulkova, which hitherto was the largest refracting telescope ever manufactured. The Observatory at Cincinnati is provided with a telescope of *eighteen* feet focal length and *twelve* inches aperture, at a cost of about ten thousand dollars. The Observatory at Washington has a telescope of *fourteen* feet focal length, and *nine* inches aperture, which cost six thousand dollars; and the Observatory at Philadelphia has a telescope *eight* feet focal length and *six* inches aperture, which cost two thousand dollars. All these telescopes were from the establishment of Merz & Mahler, successors to the celebrated Fraunhofer, at Munich in Germany.

The question is almost daily asked, why do you not patronise American artists? Can we not make good telescopes in this country? To this question, the answer has uniformly been in the negative. Some very good reflecting telescopes have been made by Mr. Holcombe, of Southwick, Massachusetts, and by several amateur astronomers. But although these telescopes afford a good light, and perform remarkably well on double stars and on nebulæ, still the style of mounting is very rude. They are not furnished with graduated circles for measuring the place of a heavenly body, and such appendages are considered almost indispensable in a regular Observatory. Moreover the mirrors are liable to tarnish from exposure to the air, so that the preference is now generally given to refracting telescopes.

The experiments which have been made in this country in the manufacture of refracting telescopes may be divided into two classes: namely, those which have employed American glass, and those which have employed foreign glass.

Several telescopes of small dimensions have been made of American glass, which have performed quite satisfactorily; but the attempts to make large telescopes with American glass, so far as the results have been laid before the public, have invariably proved failures. At

several establishments in this country, glass is manufactured which answers perfectly all the ordinary purposes of the arts, and for transparency compares well with foreign glass: but it has been found impossible to obtain large specimens possessing that entire homogeneity and freedom from veins which are demanded in a lens in order that it may produce a perfect image. Hence, notwithstanding some high pretensions to the contrary, no *good* telescope of large dimensions has yet been manufactured of American glass. The Munich telescopes are all made of glass manufactured under the direction of Merz & Mahler themselves, by peculiar methods which are carefully concealed from the public, and which are the results of the experiments of Guinand and Fraunhofer.

The experiments which have been made in this country in the manufacture of refracting telescopes with the aid of foreign glass, have been more successful. Passing by several very good instruments of small dimensions, it is believed that the telescopes executed by Mr. Henry Fitz of this city are the most remarkable of any hitherto made in America, for their size and quality. Mr. Fitz has completed three telescopes of *five* feet focal length, one of *seven* and one of *eight* feet. Two of these I have had an opportunity carefully to examine. One is a telescope of *five* feet focal length, and *four* inches aperture, now in the possession of Lewis M. Rutherford, Esq.; the other is of *eight* feet focal length, and *six* inches aperture. These are both achromatic: that is, each of them consists of two lenses, one of flint and the other of crown glass. The flint lens is made of glass imported to order from Paris; the crown lens is of French plate glass. The five feet telescope is mounted upon a substantial equatorial stand, under a revolving dome, which affords every facility for directing the tube towards any part of the heavens. Having turned the instrument towards Saturn, the planet appeared of a beautiful white light without any sensible prismatic dispersion, and with a perfectly sharp outline. The shadow of the ring cast upon the body of the planet, and the shadow of the planet cast upon the ring, were both beautifully seen, and also the belted appearance of the planet. It showed distinctly *five satellites*. The planet Neptune was seen without any appreciable disk; but its light was such that it was distinctly visible in a brightly illumined field. The planet Mars was seen perfectly round and sharp, with an irregular stripe of a dark shade across the middle of the disk. Very faint stars are exhibited in this telescope with remarkable distinctness. The small star "debilissima" near Epsilon Lyrae, which is considered a good test object for a seven feet achromatic, can be seen in it with comparative ease; and the companion of the Pole star is visible in an illumined field.

The trial of the other object glass of eight feet focus was made under more unfavorable circumstances, as the telescope is not yet entirely completed. The glass is finished, and it is set in a neat mahogany tube; but it has no permanent stand, nor appropriate set of eye-pieces. We were obliged to mount it upon a tremulous stand, in the open air; make use of an eye-piece which belonged to the smaller telescope; and follow an object in its diurnal course by moving the

tube with the hand. Under all these disadvantages the telescope performed admirably. It showed the disk of Saturn sharp and distinct, and of a beautiful white light. The shadow of the ring upon the planet, and of the planet upon the ring were easily seen, and there was scarce a trace of uncorrected color to be ascribed to the lenses.

On the whole, Mr. Fitz has succeeded admirably in grinding lenses of the proper figure. He has executed several object glasses which are almost entirely free from chromatic and spherical aberration—and which, when tried upon the most difficult test objects, compare well with the best productions of Fraunhofer. It is to be hoped that Mr. Fitz may receive that encouragement in the manufacture of telescopes, which his ingenuity and perseverance so richly deserve.

ELIAS LOOMIS.

New York University, Nov. 12, 1847.

N. Y. Cour. & Enq.

Mammoth Starch Factory in Michigan.

We learn from the "*Detroit Free Press*," that Mr. Mawbry Chamberlain, of Vermont, removed to Almont, Lapear County, Michigan, about two years since. Mr. C. carried on the business extensively in Vermont, and is still interested in two large establishments, managed by his brothers, near Windsor, Vt. It seems that he has now erected a factory in Almont, to carry on the manufacture of starch on a more extensive scale than at any similar factory at the East.

The factory is 214 feet long, and 40 feet wide, including an L. The main building is 134 feet long—14 of which are used for an engine room—and is two stories high. The lower part has 64 tubs, holding about 600 gallons each, giving a total of 28,400 gallons. The L part is 80 feet long, by 40, of brick, one and a half stories high, for a potato-bin. Loaded teams drive up a platform into the second story; and, following a circle, 13 teams can unload at a time, through trap doors over the bin, which is calculated to hold 40,000 bushels. One hundred and thirty loads have been received in a day, making a total of 4000 bushels.

In the second story of the principal building is an oven, 100 feet long by 18 wide, for drying the starch—or rather, I should say, an oven of 200 feet by 9, as there is a division in the centre, with doors some 10 feet apart. In the oven, there are sets of pans, one above the other, which can be turned at pleasure. It is heated from the steam works, and conductors of heat are carried in tin pipes all over the building. The whole machinery is a specimen of so much ingenuity, that I cannot describe it. You must visit it—it is worth the journey. The proprietor, who is a gentleman much beloved here, kindly allows strangers to go through the establishment, and does not confine it to the sign, "no admittance," as at similar works in New England.

The potatoes are shoveled from a bin into a hopper, where there is water constantly running into it, and there they are as thoroughly

washed by machinery, as a cook could do it for your dinner. Then, by the action of machinery, they are separated from the dirt, stones, and sticks, and pass on to two cylinder graters, at the rate of 100 bushels an hour. From the graters, by the action of machinery, they go into the sieve that separates the starch from the potato. The pulp then passes into four large cisterns, and then, again, machinery pumps it into the 64 large tubs or cisterns, before alluded to, for settling. Then the water is drawn off, and the starch, by a forcing-pump, is carried into the second story, and, when settled, put into the oven I have before spoken of, which is calculated to bake a day's work being the starch from 1000 bushels, or 60,000 lbs. of potatoes. The starch is packed in casks, and shipped East. The cost of the factory is $12,000.

Considerable starch was made last season, but the rotting of some 30,000 bushels of potatoes last fall, curtailed the quantity anticipated. This large quantity of the raw material was thrown away. It served to feed many cattle and hogs of the neighborhood for some months.

The pulp remaining as worthless, is used in fattening hogs, which the proprietor has in a yard adjoining.

The factory price for potatoes is 10 cents a bushel. Mr C. has contracted with various farmers to the amount of 400 acres. The average number of bushels raised last year on an acre was 275. Allowing the same this year, it will amount to over 100,000 bushels; but this is not half the quantity wanted. Farmers were unwilling to contract, fearing the rot. Present indications are good for the crop. All varieties are used, even the Rohan.

It takes the fall and winter to destroy the potatoes, then wheat and corn are used for the same purpose. The quantity made from the potato per year will not be far from 1,000,000 lbs., or 400 tons. It sells for $5 a hundred in New York. Hunt's Merch. Mag.

Fusion of Mercury.

The result of M. Person's experiments on the congelation of mercury, and the latent heat of fusion, is that the heat requisite for the fusion of mercury is about eight times that required to change the temperature of water one degree. M. Person observes that the quantity of heat necessary for the fusion of metals is according to the order of their tenacity. Civ. Eng. & Arch. Jour.

Steam Power in France.

It appears from a recent official return that the total number of steam engines in France in 1845 was 207; in 1840, it was only 109. Another return respecting the produce of the iron mines states that in 1845 the quantity of iron cast was 439,000 tons, whereas in 1825 the quantity was only 190,000. The price of bar iron, which in 1825 was 48f. the 100 kilogrammes, was in 1845 only 34f. Ib.

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